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IDENTIFIERS *Blooms Taxonomy of Educational Objectives

ABSTRACT

In the planning phase of this ESEA Title III Project, a learning unit was developed to serve as an outline for the first draft of the model. The field-lab approach is stressed in the belief that the "real world" offers a unique learning opportunity, since it includes the "how" of living as well as the inquiry process of decision-making in the selection of solutions to problems. The curriculum content is centered around one specific problem: How does man provide for and conserve an indispensable resource --water? The scope of instruction is outlined in terms of specific concepts and generalizations, and instructional behavioral objectives. The inquiry teaching strategy is discussed with reference to the cognitive levels of Bloom's taxonomy (cognitive and affective domains). A teacher background booklet provides descriptive material on the field-lab: the Quabbin Reservoir System in Massachusetts. Bibliographies are included for activities, teacher resources, student books, and the references used in the model development. The revised version of the Test for Concept Learning and Identification of the Cognitive Process (SO 000 085) is appended. SO 000 069 and SO 000 070 describe Curriculum Model #2 and the general R-L-L Curriculum Model. (SBE)

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MODEL FOR THE DEVELOPMENT OF INQUIRY-ORIENTED SOCIAL STUDIES CURRICULUM MATERIALS USING COMMUNITY RESOURCES AS LEARNING LABORATORIES

MODEL #1

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SO 000 068

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Note: Page numbers for VIII - XI are not in sequence as these sections are excerpted from the original Background Paper on Water developed for teacher use during the pilot study.

(XII - Original pilot test)

Resource Learning Laboratory

Title III - PACE Projects

Planning Grant

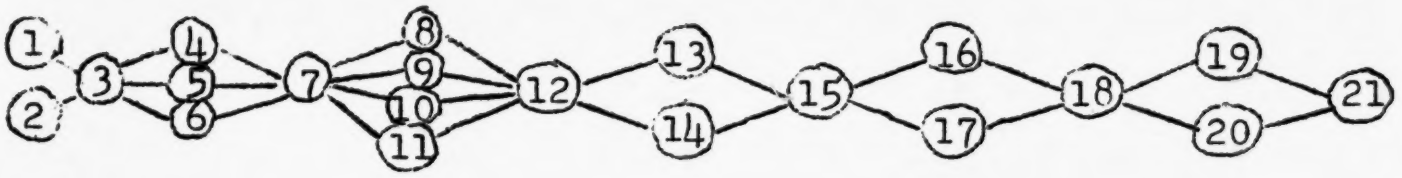
MODEL FOR THE USE OF COMMUNITY RESOURCES

This is to serve as an outline for the first planning draft of a model for the use of community resources. The model centers on:

1. an examination of those problems relevant to students for living in the adult world of the coming decade.
2. the selection of resources for a "real life" study of these problems.
3. the use of the inquiry process in the search for solutions to the problems.
4. the behavioral outcomes anticipated from the study
5. the teaching strategies necessary for the attainment of the instructional objectives (the how of teaching).

The field-lab approach is stressed in a belief that the "real world" offers a unique opportunity in the learning process as it deals with the how of living as well as the process of decision-making in the selection of solutions to problems.

FLOW CHART FOR THE DEVELOPMENT OF CURRICULUM MODELS



1. Selection of Problem
2. Selection of Field-Laboratory
3. Scope
4. High order concepts
5. Low order concepts
6. Generalizations
7. Instructional Objectives
8. Content
9. Media
10. Performance measures
11. Learning Activities
12. Teaching Strategies
13. Cognitive tasks
14. Academic Skills
15. Curriculum Developed
16. Piloting in Classrooms
17. Evaluation
18. Revision
19. Piloting
20. Evaluation
21. Dissemination

TEACHER MATERIALS -

1. Background Paper - WATER -

   a. Information includes water uses, sources, methods of storage, pollution factors, control methods, conservation techniques.

   b. Bibliography - resource material available with complete addresses, teacher books, pupil books, films, filmstrips.

2. Background Paper - QUABBIN RESERVOIR -

   a. Teacher's Guide for the field-lab experience

   b. Teacher background information relative to Quabbin

   c. Cross section of the dam with transparency

   d. Map of the watersheds and route of the aqueducts to Boston

3. Historical Background of the Quabbin Towns-

   as excerpted from Historic Hampshire by Clifton Johnson

4. Topographical maps from the U. S. Geological Survey of the Quabbin area-

5. Activities

   listing and describing experiments and activities related to water, soil, and conservation

6. Transparency Packet - overlays of the Swift River, the Quabbin towns and their boundaries, the highways and roads, topographical features, and the land taking for the reservoir

   cross-section of the dam, water wheels, rivers of Massachusetts, Boston - 1650

7. Maps - road maps - 1937, maps of the area - 1930, map of Boston 1777, New England and physiographic features, rivers of Mass, watersheds of Mass, physiographic features of Mass.

8. Films - as scheduled on the film list

Note: For additional reference material see Teacher Bibliography. Most of these materials are available at Resource Learning Laboratory.

Student Materials - in classroom quantities

Booklet #1 a. Geography of New England and Massachusetts

#1 b. Water Wheels and Water Power

Booklet #2 Boston's Search for Water

Booklet #3 History of Boston

Booklet #4 Early History of Quabbin Towns

Booklet #5 Gazetteer of Massachusetts

Booklet #6 Report of 1937 - House Report - Quabbin

Booklet #7 Report of 1966 - Senate Report - Supplementary Water Supply from the Millers River

Supplementary Materials - 10 copies per classroom

Report of the Secretary of the Commonwealth-1852 listing manufactures, businesses and values of such

Western Massachusetts A History - Diary 1818 describing travel through the Quabbin area

Massachusetts Register - Business listing trades, services, and business

A Case Study - Daniel Shays's Rebellion describes the reaction of a group of people to government control.....a method of active dissent.....This could be used for comparative purposes with the methods of expressing dissent over the placement of the reservoir.

Scrapbook - Newspaper Articles

Pictures - Homes, and Buildings of Ghost Towns

Construction of Quabbin

CONTENT OUTLINE

Problem: HOW DOES MAN PROVIDE FOR AND CONSERVE AN INDISPENSABLE RESOURCE: WATER?

G-1 I. What part does water play in man's existence?

A. What are man's uses of water? (needs)

1. Domestic
2. Industrial
3. Production of hydroelectric power
4. Utilization of waterways - transportation and navigation
5. Irrigation
6. Recreation
7. Pollution Control
8. Source of Food
9. Flood Control

B. Where does man find water?

1. Source
2. Supply Storage (wells - tanks - reservoirs)

II. How has man obtained water through the years?

G-3 A. What is the early history of man's attempts to provide water in Massachusetts: Boston?

G-4 B. What has been the history of present century planning for water?

1. Wachusetts Reservoir
2. Quabbin Reservoir
3. Pollution Control - Health and conservation

* G-1 etc. refers to stated generalizations

III. What factors are involved in providing for a water supply?

A. Why was Quabbin placed in its present location?
B. What are the conditions necessary for an adequate water supply?
G-5 C. Was the placement of Quabbin a good choice?
D. What problems does man encounter in attempting to provide for a basic need: water? (allocation)
G-6 1. Economic
2. Geographic
3. Political
4. Social

IV. How does man insure an adequate supply of water for the future?

A. What predictions can be made as to supply and demand?
G-2 1. Climatic factors
2. Increased technology
G-3-4 3. Population increase
G-5 4. Regulatory measures

B. What are possible sources for supplementing the present supply?

1. Other watersheds
G-6 2. Supplement Quabbin
3. Desalinization
4. Regulatory measures on usage
5. Technological advancements which conserve present supply

SCOPE OF INSTRUCTION (Concepts and Generalizations)

A. Concepts -

1. Resources
   a. natural resources
   b. human resources
   c. capital resources-technology

2. Scarcity
   a. supply - limited resources
   b. demand - unlimited wants

3. Values
   a. land values
   b. rural-urban (differences)

4. Population patterns
   a. rural
   b. urban

5. Cultural change
   a. technological change (effect)
   b. rural lag (impact)

6. Production
   a. economic activity
   b. distribution

7. Decision-making
   a. governmental authority
   b. political strife
      self-interest
      public-interest

natural resources ----------
- watercycle
  - evaporation
  - condensation
  - precipitation
- watershed
- topography
  - basin
  - river
  - ridge
- climate

B. Generalizations

1. To exist, man must utilize natural resources.
2. Water is one of the natural resources most indispensable to man.
3. Man adapts, shapes, utilizes and exploits the earth.
4. The extent of man's utilization is related to desire and technology.
5. Human societies undergo continual changes in response to various forces.
6. Competition for the acquistion of the earth's natural resources sometimes results in political strife.

INSTRUCTIONAL OBJECTIVES: BEHAVIORAL TERMS

Instructional Objectives in behavioral terms are those objectives which provide a description of the behavior of the learner in terms which make:

1. the behavior observable
2. the behavior measureable

given a particular instructional situation.

These behavioral objectives tell what the learner is doing, under what conditions, using what materials and the degree of accuracy he must attain for acceptable performance.

As a result of having studied the Quabbin Reservoir system, the student will be able to:

PRE-FIELD

I. Identify man's uses of water, describe the sources and methods of storage for supply of the water.

A. List man's uses of water from recall and discussion

Teaching Strategy: (Cognitive Task #1)

Step 1 enumerating and listing

Eliciting Question What does man use water for? List responses on board as given by the students.
What belongs together?

Step 2 grouping

Can we group any of these together?
Group the responses.

Step 3 labelling categorizing

How would you name these:
(See categories listed in the Content Outline)

B. Describe man's sources of water using Booklet 1-A. (watercycle - rivers and streams, ground water)

Repeat: enumerating listing grouping labeling

C. List and describe man's methods of storing water for supply purposes, recalling from knowledge and using Booklet 1-B.

II. Describe man's attempts to provide an adequate water supply through the years.

A. List in chronological order the events in the development of Boston's water supply. Use Booklet #2

B. Describe the role of Wachusetts and Quabbin reservoirs in Boston's attempts to provide an adequate water supply.

FIELD LABORATORY EXPERIENCE: Refer to Teacher's Guide for Field - Lab Study.

III. Determine the economic, geographic and demographic factors that resulted in the decision to place Quabbin in its present location.

A. Develop hypothesis relative to the decision making for the placement of Quabbin. Consider the population pattern, economic activity, geographic, social and political factors.

Teaching Strategy

Steps -

Motivational Question

Eliciting Questions: Why does man need water?.....What are his sources?..

WHY WAS QUABBIN PLACED IN ITS PRESENT LOCATION?

List reasons-recording

Possible hypotheses - (developed by students)

Form possible hypothesis grouping reasons into larger categories

Quabbin was placed in its present location because:

Labelling the categories

1. it required the displacement of a relatively small number of people.

2. of its natural landforms, vegetation, soil and required the least amount of re-shaping.

3. of the amount of rainfall and pure water (rivers) to be found in this area.

Academic Skills:

locating

outlining

4. of the availability of enough land to develop a reservoir which would satisfy the projected needs (industrial - changing uses - pop.)

5. for political reasons

B. Gather and classify data from gazatteers census reports and maps pertaining to Enfield relative to population, economic and social activity. Record data on data-retrieval chart.

Sample - Data-Retrieval Chart

Concepts	Enfield
Population Dwellings	The population steadily decreased by 25% over a 50 year period. 1895 - 1925. After legislature passed Act in 1927 - there was a 33% decline in that 5 year period. 1925-1930
Public Facilities	1876 - 8 schools....2 churches...,a meeting house....railroad station....and P.O. 1938 - only 7 graduated from elementary school.
Revenue	Not enough data
Industry	Decrease in manufacturing from 1859-1912 3 major fires caused industries to move textile industry on the decline in New England towns...no indication of change in farming
Land Area	99.5% of Enfield was undeveloped woodland and farm area.
Note: -----	The above serves only as a sample of the kind of information to be gathered. It should merely serve as a guide for the teacher not as the criteria for performance.

TEACHING STRATEGIES- Upon completion of the D-R chart begin to make inferences after interpreting the data. The following includes suggested questions for this purpose.

Teaching Strategy #2--Interpretation of Data

Interpreting, inferring and generalizing

teacher.._____ Student is..._____

Eliciting Questions	Overt Activity	Covert Activity
What did you find about the economic activity of Enfield; about the population. about the social activity? etc.....	identifying points	differentiating recording on d-r chart
Why did the population decrease from 1850-1900	explaining items of identified information	relating points to each other determining cause and effect relationships
Was industry expanding? What does this mean?	making inferences	going beyond what is given finding implications
What implications for the growth of these communities?		extrapolating
What did you find out about the: economic) political(activity) social)	(Dana)Greenwich (Prescott identifying points	differentiating (record d-r)
What does the data suggest?	inferences	finding implications
What can you conclude?	.. ..forming generalizations.....	

(Taba Model)

C. Gather and classify data from similar sources for Greenwich, Dana and Prescott. Record on data-retrieval chart.

Cognitive skills:
discriminating
organizing
selecting

Concepts	Enfield	Dana	Prescott	Greenwich
Population		declining 1860-1876 1860-1895 18% 166 dwellings	declining- over ½ pop. left between 109 dwellings	50% decline in pop. between 1850-1895 143 dwellings
Public Facilities		6 schools 2 P.O. R-R town hall 4 churches	5 schools 3 churches 1 P.O.	2 churches 2 P. O. 7 district schools 2 stage coaches
Revenue		118 farms $153,416. woods $43,565. tax 80/100	not enough information	factories $23,475 farming $311,320
Industry		Mostly farms better grazing than tillage. Few small industries	all small no large industry	very little appears to be declining
Land Area		118 farms 2699 acres woodlands 2 ponds- 278 acres	farms and woodlands 20/sq. mi.	123 farms 11,191 acres of tax land

Cognitive Task #2
Cognitive skills:

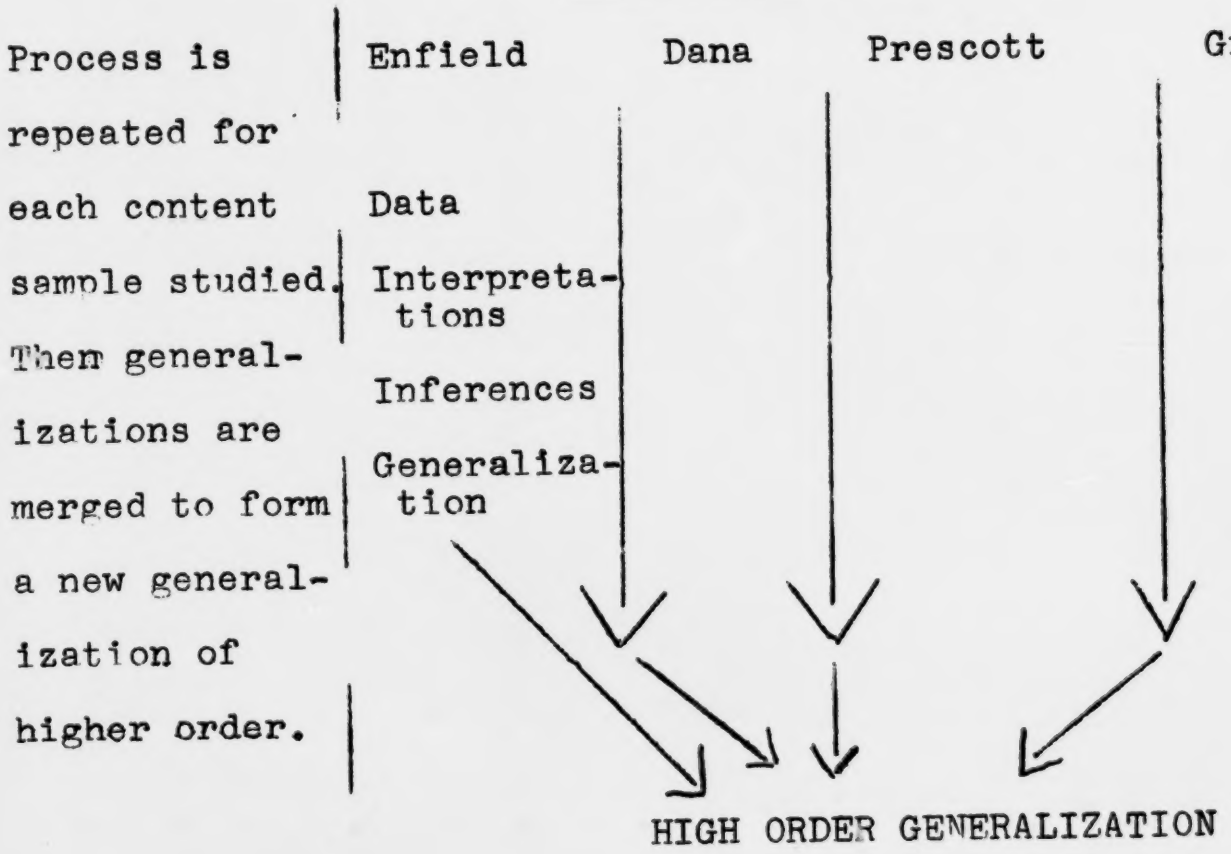
inferring

generalizing

D. Based on the above data the student will be able to generalize as to the economic, social and geographic conditions of the total area of Quabbin. Record these inferences and generalizations.

Example of possible generalization from data retrieval chart

Generalizations: Population pattern is affected by economic activity.



Academic skills:

locating

outlining

mapping

E. Gather and record economic, social and geographic data pertaining to Boston during this same period of time and identify the factors contributing to a need for an additional supply of water. (Contruct a time-line and list the stages of development in the Boston water supply).

Cognitive skills:

organizing

selecting

Use data-retrieval chart for recording information gathered from:

Boston Booklet
Maps
Newspaper Articles

IV. Determine the factors necessary for an adequate water supply.

Cognitive skills:

discriminating

selecting

inferring

A. Based on the state reports, classroom experiments and using topographical maps, list those factors necessary for a good watershed area.

B. Examine the watershed areas in Massachusetts (maps in booklets) and using the criteria in II-A., list the possible areas available for developing (in order of merit) for supplementing the existing Boston supply.

V. Identify the problems man encounters in providing for a basic need: water.

Cognitive skills:

discriminating

organizing

selecting

A. Based on historical accounts identify the changing conditions which caused a need for water.

B. Using geological surveys, identify changing climatic factors affecting water supplies.

C. Based on town records, gazetteers and other related materials, identify the social institutions and groups in the Quabbin area and relate what happened to these as a result of the placement of the reservoir.

Cognitive skills:

discriminating

organizing

selecting

inferring

generalizing

V. Identify the problems man encounters in providing for a basic need: water.

D. Using newspaper articles, identify the situation of political strife in the decision-making process indicating the arguments for opposing sides.

Cognitive Task #3

Cognitive skills:

predicting

VI. Identify possible solutions to the problems of providing for future water supplies.

A. Develop a hypothesis as to whether Quabbin will be able to meet the projected needs for 1975 using MDC reports, rainfall charts and anticipated demands.

B. Propose one or more possible solutions to the problem supporting them with data.

C. Using previously established criteria, choose the best solution.

Teaching Strategy #3

Application of Principles -- Predicting

Eliciting Questions:

Predicting consequences	What will happen if the demand for water exceeds the amount supplied by Quabbin? (Analyze the nature of the problem)
Explaining and supporting the predictions	Why do you think this would happen?
Verifying	What would it take for this to be generally true?
Predicting	What are the alternative solutions?
Analysis	Which alternative shall we choose?
Evaluation	Is this consistent with the criteria extablished in the study?

DECISION-MAKING - ANALYSIS

Identifying Conflicting Views in the decision making process

	Quabbin Towns	Boston
How did they feel about the land for the reservoir		
change		

What was changing in the urban community?

How does a society choose between using resources for present needs or conserving for future needs?

What factors influence decision-making?

What caused these changes?

Generalizations:

CHART SHOWING RELATIONSHIP OF BEHAVIORAL OBJECTIVES TO THE COGNITIVE LEVELS OF BLOOM'S TAXONOMY

Cognitive and Affective Domain

The cognitive and affective objectives (Bloom, 1956; Krathwohl, Bloom, and Masia, 1964) are used as guides for the development of questions and activities to be used in oral, written or performance tests.

Cognitive Domain - the categories are arranged in a hierarchy

1. Knowledge (memory) - specific terms and facts
   trends
   classification
   categories

2. Comprehension - translation - symbols, verbal
   interpretation
   reordering ideas
   extrapolation
   by extension to past and future

3. Application - applying terms and concepts, generalizations, criteria to new situations

4. Analysis - identifying elements
   relationships
   organizing principles

5. Synthesis - putting together of elements and parts so as to form a whole
   involves the working of parts into a pattern not clearly there before

6. Evaluation - judgements about the value of -
   may use internal or external criteria

Affective Domain

1. Receiving - involves the willingness to receive

2. Responding - willingness to respond

3. Valueing - acceptance of a value
   preference for a value

Affective Domain

4. Organization - conceptualizing a value
the way organizes values

5. Characterization - the place of the value in the individuals hierarchy
the controlling behavior
controlling tendencies

Cognitive level ——————→	Behavioral Objective
1. Knowledge	As a result of having studied the Quabbin Reservoir system the student will be able to: 1. locate the reservoir area on a map 2. identify the communities affected by the decision 3. state the purpose for which water is used 4. recall the history of Boston's attempts to secure an adequate supply of water 5. define the following terms watershed watercycle precipitation evaporation reservoir hydroelectricity river basin tributary mountain ridge New England
2. Comprehension, Interpretation Extrapolation	1. interpret a chart of population data by making a graph, reading it and explaining the graph 2. predict sources of water in the state

3. interpret a topographical map

4. translate a topographical map into a model

5. explain the functioning of the dam

3. Application

1. predict solutions to the water problems of the city of New York

2. predict solutions to water problems of the middle east

3. predict the conditions which would prevail if the average rainfall were to decrease by 10 inches a year

4. predict the problems to be encountered in the construction of the unirail from Boston to New York City

4. Analysis

1. analyze a series of newspaper articles and distinguish between the facts presented and opinions (bias)

2. analyze information and recognize which facts are essential to support the hypothesis

3. analyze the decision making process in the placement of Quabbin and list logical fallacies in arguments

5. Synthesis

1. able to write creatively a story, essay or play about the history of the Quabbin Plantation Ghost-towns, Displacement of people etc.

	2. able to integrate the results of investigation of water sources into a solution to the problems of Boston..Springfield.. Sturbridge
6. Evaluation	1. able to apply the given criteria for an adequate reservoir and form a judgement as to the adequacy of the present supply.. future needs..etc...
	2. able to recognize and weigh the values involved in alternative courses of action for additional water supply

Field-Lab Experience ---- Quabbin Reservoir

Alloted time at site: (approximately 2 hours)

Field-Lab Skills

Purpose of trip - As a result of this field - lab experience the child will be able to:

1. locate on a map the traveled route
2. identify names of rivers on route
3. indicate the direction of flow of the river
4. evaluate his relief model of the reservoir
5. describe the setting of Quabbin as to land forms etc.
6. describe the community of Quabbin by listing the services provided
7. identify surrounding mountain ranges visible from the tower
8. describe the nearby community of Ware by observation en route
9. draw a plan of an aqueduct and define its purpose
10. compose a list of uses for Quabbin Reservoir and watershed land
11. draw a picture of Windsor Dam (cross-section)
12. estimate water level in relation to capacity

Media-Maps of Quabbin
Maps of Route

Observational skills
What did you see?

Note: also the Teacher's guide for field-lab experience

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This section of the bibliography includes those references used in the development of the model. Subsequent sections will include specific references for curriculum study #1, both teacher and pupil.

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VIII
Background paper-

Teacher Booklet #2

Quabbin Reservoir System

Introduction

This booklet provides descriptive material of the Quabbin Reservoir system for the teacher. Included are diagrams and maps, copies of which are available in transparency form.

The material is written in an attempt to provide for the teacher the needed background material prior to the field lab experience. Many of the engineering details have been eliminated but can be found in the MDC Report of 1937. This report has been re-written for the students use.

The Field-Lab Experience

The field trip is planned as a part of the introduction to the study concerned with the decision making for the placement of the reservoir. It would follow part II of the outline and precede the hypothesizing in part III.

The field experience provides the scene or laboratory for inquiry. It allows the student to visualize the reservoir today, its setting - location and component parts, prior to inquiring as to the reasons for its placement. It provides the what is prior to asking the why.

Concepts related to the Field-Lab experience

Reservoir	Natural features
* dam	mountains
*. dike	ridge
* spillway	elevation
* aqueduct	river
	river basin
	* watershed

* It should be noted that these are new concepts while all others are applied concepts.

Instructional Objectives for the Field-Lab Experience

As a result of the field experience the child will be able to:

Application of knowledge of terms

1. Describe the physical features of the reservoir: mountains, valleys, rivers, ridges, drainage pattern.

listing the parts of the group

2. Describe the component parts of the reservoir and identify their function: the dam, the dike, the spillway, the aqueduct, the power station, the tower, the boat patrol and governing body.

conceptualizing (watershed)

3. Given the description of Quabbin and its watershed, identify the component parts of a watershed.

Quabbin Reservoir and the Metropolitan Water District serve some 2,000,000 Massachusetts residents in 40 cities and towns. Quabbin, the largest domestic water supply reservoir in the world has a storage volume of 415,000,000,000 gallons of water. It has a shoreline of 175 miles including the 100 rocky and mountainous islands scattered throughout the reservoir.

The construction of Quabbin involved the changing of the boundaries of six towns and three counties and eliminating from existence the towns of Enfield, Dana, Greenwich and Prescott. Sixteen miles of the B & A Railroad were discontinued. About 2,500 people living in 650 houses were required to find other homes. About 80,000 acres were acquired for sanitary protection and construction purposes. A new cemetery was completed and the graves of about 7,500 moved.

The impounding of water in Quabbin Reservoir was begun in July of 1939.

Sources of Supply

The district is authorized to take from the Swift River, the entire flow except that a sufficient quantity must be released from the reservoir to insure the maintenance of a flow of 20 million gallons daily into the mill pond at Bondsville and to take from the Ware River (at Coldbrook) the flood flows in excess of 85 million gallons daily. This diversion from the Ware River cannot be made in the dry months between June 1 and December 1 except with permission of the State Department of Public Health.

In addition to these restrictions by Massachusetts Legislation, the War Department, in the interest of navigation on the Connecticut River does not permit any diversion to be made from the Ware River between June 15 and October 15. It further requires, under certain conditions of extreme drought, a release of additional water from Quabbin.

The Dams

Quabbin Reservoir in the valley of the Swift River, a tributary to the Connecticut, is created by two large earth dams. These dams were built to impound the waters of the reservoir. The main dam across the Swift River was named Windsor Dam, after the late Chief Engineer, and was completed in 1940. It is 2,640 feet long, 170 feet high above the bed of the river and 295 feet above the sound ledge foundation. It contains 4,000,000 cubic yards of fill above the original surface. At the base of the dam a power station generates electricity from the water released by the reservoir to maintain the flow of the Swift River.

A 400 foot spillway with its crest at an elevation 530 feet above mean low tide was cut through a rock gorge east of the dam and fixes the high water elevation of the reservoir.

The smaller of the two dams, Quabbin Dike is 2,140 feet long, 135 feet high above the bed of Beaver Brook and 264 feet above the sound ledge foundation. Both dams were built with concrete core wall foundations to sound ledge consisting of a row of caissons across each valley and the superimposed embankments were built by the full hydraulic-fill method.

The Aqueduct

Quabbin aqueduct extends from the eastern shore of Quabbin Reservoir to the upper end of Wachusett Reservoir. It has a total length of 24.61 miles, is the second largest completed continuous tunnel in the world and is large enough to run a Greyhound bus through. About 13 miles from the Wachusett end it passes under the Ware River (Barre) where the flood flows of the Ware River are directed into it.

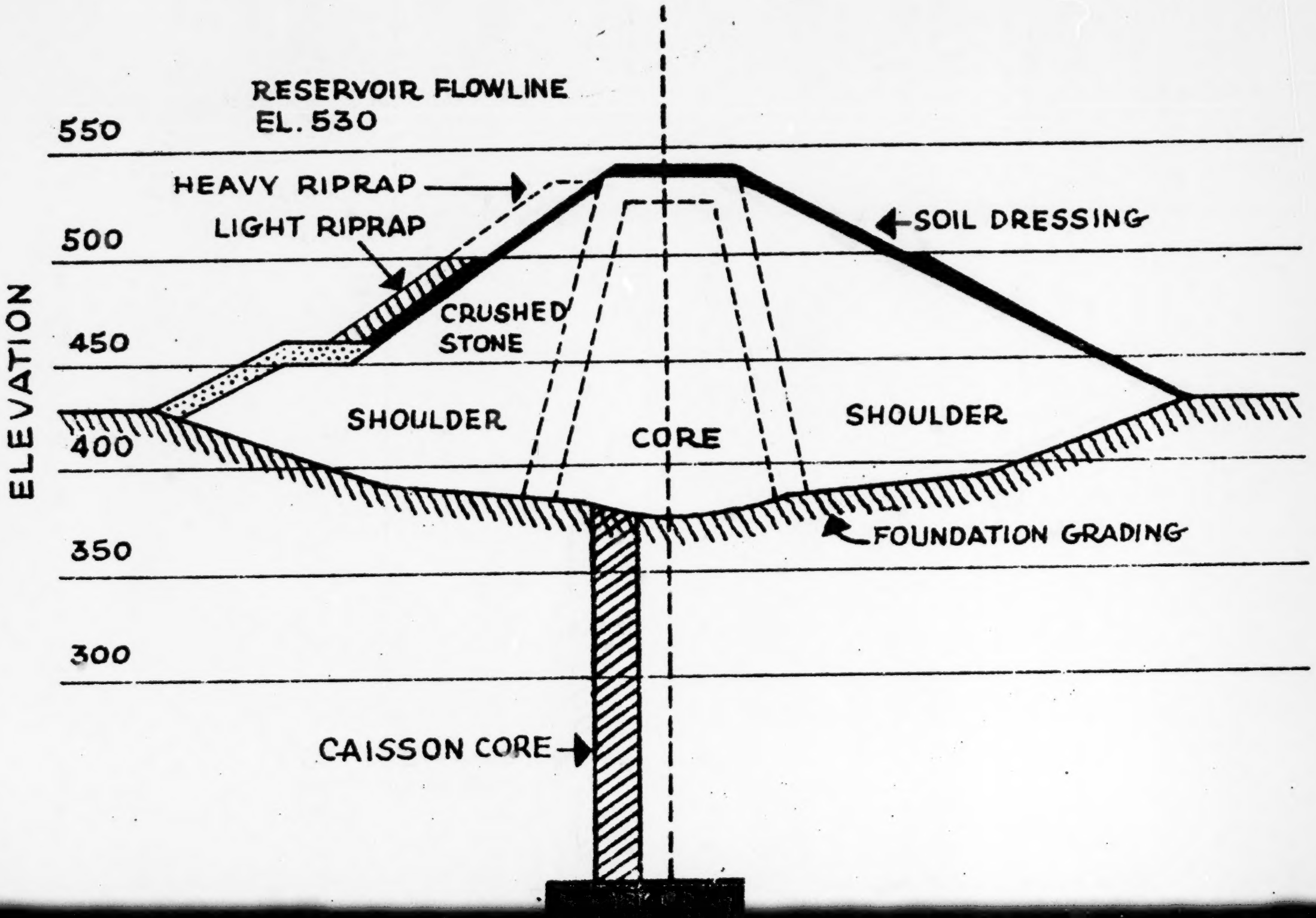
The Ware River Intake Works are higher than either Quabbin Reservoir or Wachusett so that water may be sent to Quabbin or Wachusett. The gates at Wachusett are usually closed when taking from the Ware River so that water can be sent westerly for storage in Quabbin (for sanitary purposes) before drawing it back through the tunnel to Wachusett. The water is discharged into Quabbin and must pass around the northerly end of the reservoir to thoroughly mix with the Swift River water.

The aqueduct tunnel was excavated through solid rock for its entire distance and was lined with concrete.

There is a new pressure aqueduct from the Wachusett Reservoir to Chestnut Hill. It is a part of a new plan of distribution including a pressure-tunnel loop under the entire district.

· CROSS SECTION OF DAM ·

Showing Concrete CORE, EARTH FILL and STONE RIPRAP



COMMONWEALTH OF MASSACHUSETTS

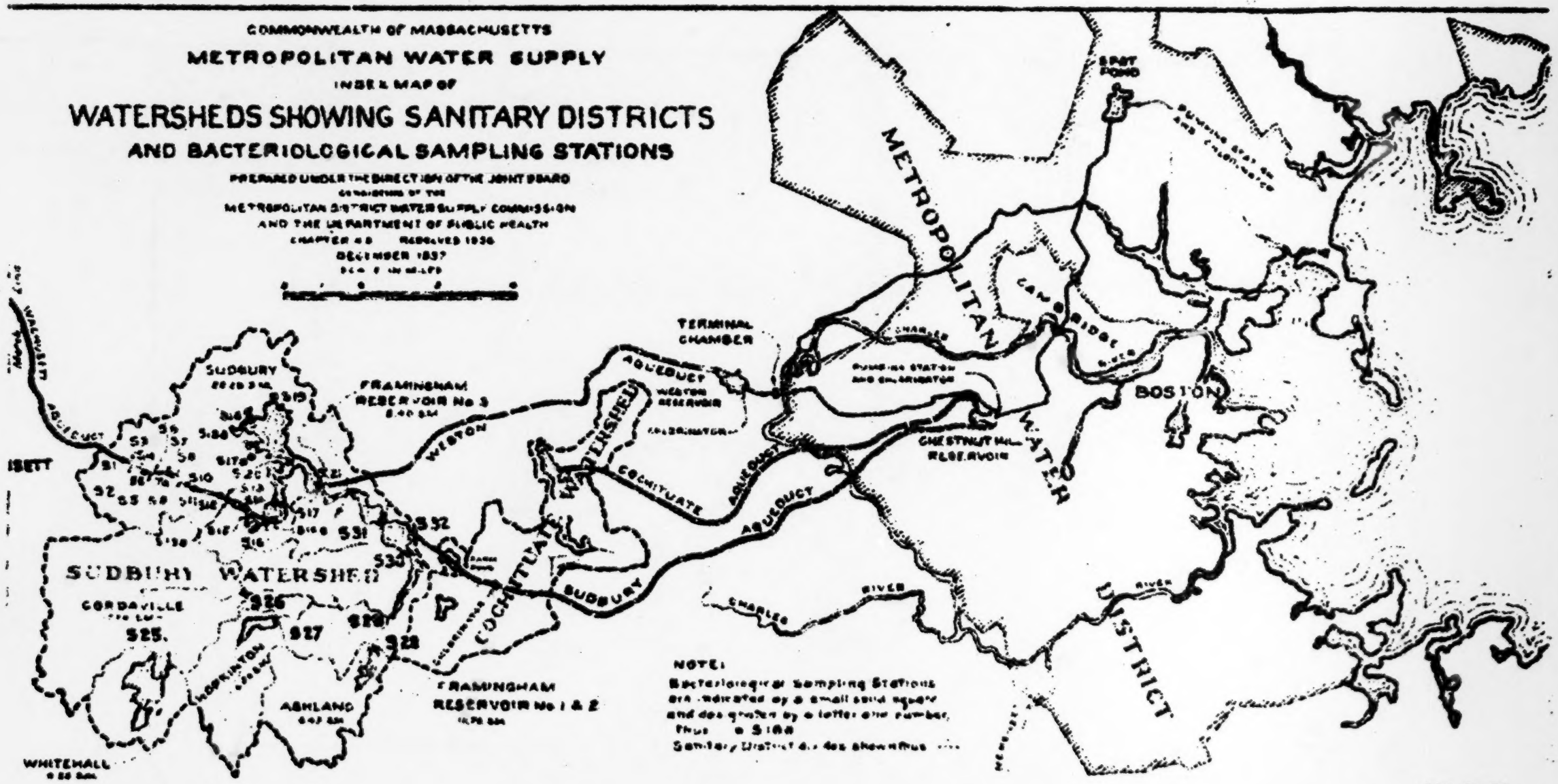
METROPOLITAN WATER SUPPLY

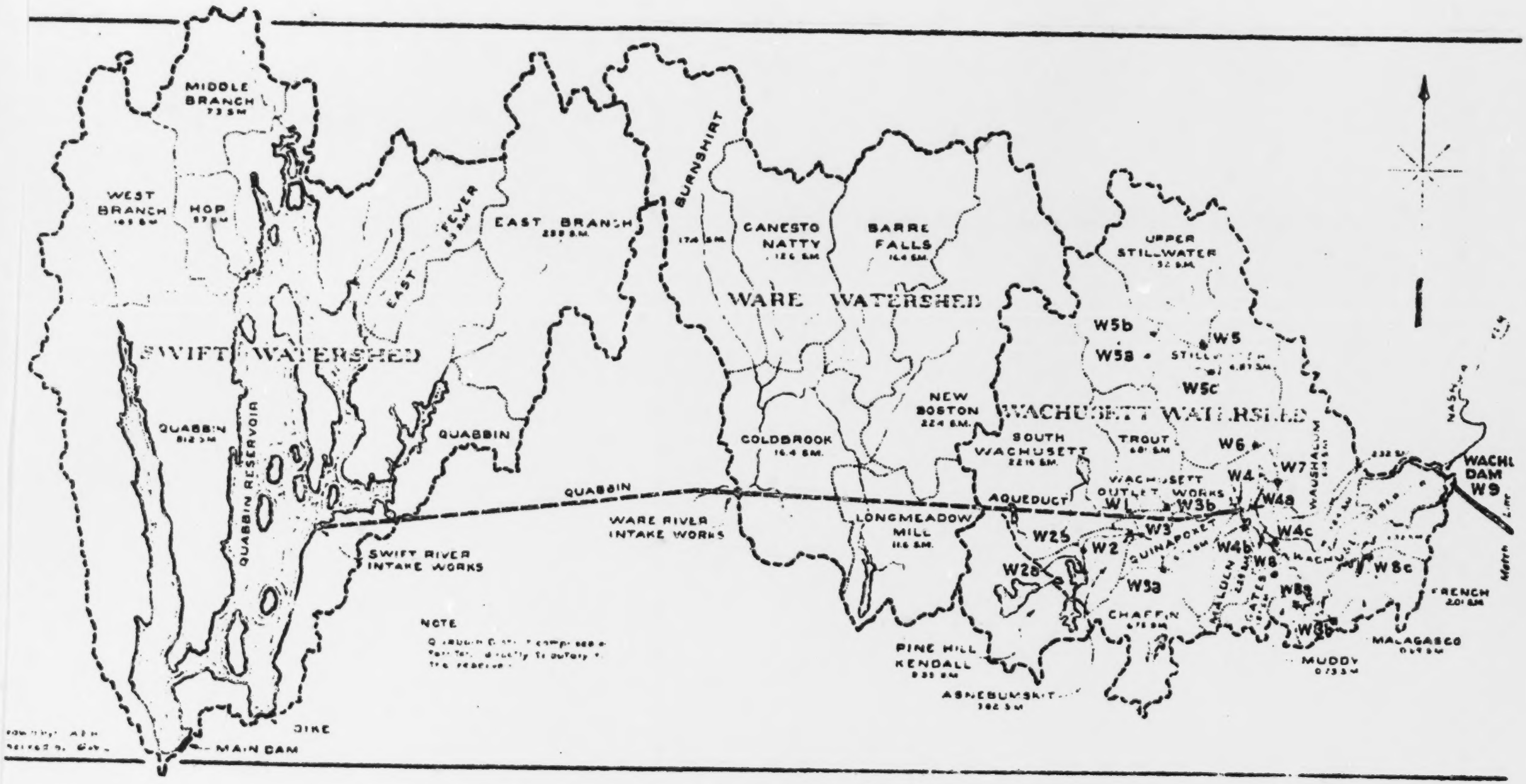
INDEX MAP OF

WATERSHEDS SHOWING SANITARY DISTRICTS

AND BACTERIOLOGICAL SAMPLING STATIONS

PREPARED UNDER THE DIRECTION OF THE JOINT BOARD
CONSISTING OF THE
METROPOLITAN DISTRICT WATER SUPPLY COMMISSION
AND THE DEPARTMENT OF PUBLIC HEALTH
CHAPTER 488 RESOLVED 1936
DECEMBER 1937




MIDDLE BRANCH
WEST BRANCH
HOP
EAST BRANCH
EAST
BURNSHIRT
CANESTO
NATTY
BARRE FALLS
UPPER STILLWATER
WARE WATERSHED
W5b
W5a
W5
W5c
NEW BOSTON
WACHUSETT WATERSHED
SOUTH WACHUSETT
TROUT
W6
W4
W7
WACHUSETT OUTLET WORKS
W1
W3b
W4a
AQUEDUCT
W25
W3
W2
W4b
W4c
W8
W8a
W8b
W8a
CHAFFIN
MUDDY
MALAGASCO
FRENCH
COLDBROOK
LONGMEADOW MILL
PINE HILL
KENDALL
ASNEBUMSKIT
QUABBIN
QUABBIN RESERVOIR
WARE RIVER INTAKE WORKS
SWIFT RIVER INTAKE WORKS
DIKE
MAIN DAM
NOTE

IX

A Bibliography of:

Activities related to Conservation and Water:

The World Book Encyclopedia - Vol. 20 Field Enterprises Ed. Corp.

- Some Experiments with water - Showing water pressure, water density and water displacement p. 97
- Making pure water. pp. 108-9

An Outline for Teaching Conservation in Elementary Schools

U.S. Department of Agriculture Soil Conservation Service PA-268. Suggested Activities for each grade level - Some are:

1st - Make and Color pictures of animals and plants in the community.
- Plant flower seeds in both good and poor soil. report on difference in growth.
- Make a balanced aquarium. (World Book, Vol 2 p.246d) Plant seeds in two pans. Water one and not the other. Show necessity of water.

2nd - Make raw soil by rubbing two soft rocks together.
- Make a list of animals - pets - farm and park animals - wild animals. Which should be conserved?
- Make a list of plants - food, erosion control, wild life food and cover.
- Make a miniature form - show conservation practices.

3rd - Study weather reports. Keep daily weather chart.
- Build balanced terrarium.

4th - Build model farm - show effects of soil erosion and deforestation.

5th - Make posters showing conservation practices.
- Make poster showing watershed in the community.

6th - Build bird feeders and houses for songbirds.
- Make a scrapbook about conservation in ancient and foreign lands.

7th - Prepare a conservation exhibit for the school.

A Guide for Teachers - Conservation - Field Enterprises Educational Corp.

- Organize Study committees to investigate and report on eight separate areas of conservation.
  Soil - water - forest - wildlife - grazing lands - recreation - mineral and human
- Make maps showing rainfall, climate, national parks and flyways of migratory birds.
- Make conservation Bulletin Board. Use Smokey the Bear as key character.
- Compile a list of conservation organizations and send for their publications
- Write creative article i.e. "The Day the Oil Wells Ran Dry" - "Water, the Key to the Future" - "Fresh Air - A Basic Need".

- Compile a complete list of conservation practices (include safe driving, brushing teeth and developments in medicine.)

The World Book Encyclopedia Vol. 5 - Field Enterprises

Educational Corp. Pg. 14 - 15
A World Book Science Project: Building a Model Dam (Excellent Project)

A Guide for Teachers - Seasons and Weather - Field Enterprises

Educational Corp.

- Make dioramas or collages of different seasons.
- Keep a cloud chart - show daily cloud formations display with chart showing various type clouds and associated weather.
- Making Weather and Experiments - Make rain by condensing water vapor in a glass over a steaming pot. Make frost by blowing on a frozen window pane. Make clouds by exhaling breath on cold day.
- Show how air expands and contracts. Tie balloon to neck of bottle - heat bottle.

Teaching Soil and Water Conservation - a classroom and Field Guide - U.S. Department of Agriculture - Soil Conservation Service.

Experiments

- Making Soil: by rubbing two soft rocks together. (glacier or stream action) Crack rocks by heating and dropping into ice water. (change in temperature makes soil) p.2
- Fill glass jar with water and freeze - glass will crack. (Freezing water expands and cracks rocks)
- How does crop cover affect soil loss?: Make plastic lined soil trays - show water runoff and erosion of bare soil compared to water absorption of mulch covered soil. p.12
- What does contouring do?: Make plastic lined soil trays. Furrow soil and sprinkle water to show water absorption of contour plowed land compared to water run-off and erosion of straight plowing. p.15
- Trace the origin of things we use: Make a game with competing sides to see which team can trace the origin of things first. Items such as - shoes, candy bars, nylon stockings and bread. p.24
- How Many Uses of Wood do you Know?: Make a list of all the items you can think of that use wood. (can be made into competitive game) p.25

- Model of Conservation Farm:
  Make two models - one showing effect of poor conservation practices and the other showing the benefit of good conservation practices. pp.28-30

Guide to Conservation and Resource Use
Wisconsin Cooperative Educational Planning Program
Bulletin No. 20.

- Make a list of basic commodities under food, clothing and shelter to show how many are products of the soil. p.23
- Make or find pictures showing "before and after" erosion control and mount them. Lable each p.24
- Make a list of ways a watershed project can promote fish, wildlife and recreation.
- Make a diagram to explain the movement of water in the soil - through the plants and into the atmosphere. Have students complete water cycle. p.25
- Have the class define the boundaries of the watershed area in which they live.
- Draw a map of your area showing lakes, streams, dams, and water power plants.
- Make a scrapbook on the conservation of water resources. p.36
- Make drawings to show various types of home water systems - gravity with suspended tank - shallow well - deep well.
- Make a drawing of a deep well, and explain its operation.
- Make a chart, with pictures, showing the function and operations of the T.V.A.
- Make a diagram showing the engineering features of the Mississippi and how they aid the control of water.
- Make a diagram showing rock strata and soil layers which make possible an artesian well. p.37
- Make a list of the kinds of fuel people use and their source. (Coal, oil, electricity, peat, gas)
- Make a collection of the different kinds of rocks and minerals found near your school.
- Make a collection of metals and identify.
- Make an outline map of your state upon which you locate mineral resources. p.45
- Draw a cross section of a coal mine - Show how coal is mined.
- Diagram an atomic reactor.
- Draw a map of the United States and locate sources of coal. p.46
- List the kinds of plants found in your community. p.52
- Make a map showing where wild plants are found and indicate the species.
- Make a scrapbook which includes pictures of various plants, sample seeds, leaves and articles on plants and plant conservation. p.53

- Make a map showing forest lands and National and State forest locations.
- Make a sketch showing the parts of plants (tree, flower, grass) - Show life cycle. p.54
- Make a list of plant diseases and insect enemies with pictures or drawings. p.55
- Build and operate a bird feeder. p. 67
- Collect and mount pictures of wildlife found in your community and identify.
- Draw or sketch wildlife in its natural habitat. List migratory habit if any. p.68
- List kinds of fish found in local lakes and streams.
- List the common enemies of birdlife. p. 69
- Write a set of safety rules for outdoor people. p.71
- Start a booklet, "My Field Trips" and in it keep a record of trips. Use pictures and drawings of conservation subjects and activities.
- Make a list of local scenic places - recreational places and historical places. Locate on Map. p.78

Outlook on Water E-1 - A Natural Resources Education Publication Massachusetts Department of Education.

Teacher's Guide:

- Construct a sand table showing natural geographic features, river, brooks, high lands, swamps, lakes etc..Have students answer ditto sheet of questions related to best home site and factors to consider in choice. (All point to importance and many uses of water.)
- Reproduce from U.S. Geological Survey Map of your area, the actual physical features of your community. Have children plan a settlement using actual history of the area.
- Construct a variety of water wheels from milk cartons. Try them in running water to determine best design.
- Teach reading of compass - Map classroom or playground. Go on "compass-walks".

Outlook on Land and Water E-1 - A Natural Resources Education Publication - Massachusetts Department of Education.

Teacher's Guide:

- Make a Bulletin Board of pictures that deal with the Water Cycle - dew on grass - people in rain- clouds, etc. (try to show the water cycle in pictures.)
- On a topographical map - have pupils locate the local water shed and outline with felt pen. With different color - outline smaller water-sheds that make up larger one.

Other Activities

- Make a list of other sources of power with pictures.
- Construct a model of a water wheel.
- Construct a model of an irrigation project.
- Construct a map showing high population areas and heavy water power development.
- Write a report about the Tennessee Valley Authority.
- Make a list of all water projects in your area.
- Collect pictures showing effect water has had on the earth's surface. Note differences of effects between water under control and uncontrolled water
- Collect pictures showing different kinds of weather conditions. List the way people and animals change the things they do as the weather changes.
- Make a list of things that come from the earth; that grew in soil, that came from animals - which we use every day. Indicate those in danger of being depleted, those that are replaced and those in plentiful supply. (Use data-retrieval chart)

- Experiment: Transpiration of moisture from a plant. Fill one drinking tumbler with water, cover with a card and place plant or leaf in hole in card so that stem is in the water. Invert a second glass over the plant or leaf. (Droplets of water will form on the inside of glass). Allow student to record his observations and make generalizations.
- Loss of water - Allow celery, carrot, apples etc. to dry (on a screen) in classroom, note change due to loss of water.
  - Heat a piece of meat to dry it out - compare weight before and after.
- Evaporation - wet two sections of blackboard - fan one and let other dry without fanning. Note speed of evaporation caused by increase of air in one area.

X. BIBLIOGRAPHY OF TEACHER RESOURCES - Water Conservation including films, filmstrips, books, booklets and pamphlets

Section #1 - Resource Material	Water and Conservation
American Insurance Association 110 William Street New York, N. Y. 10038	Request name and address of your local fire rating organization.
American Water Works Association, Inc. 2 Park Avenue New York, N. Y. 10016	Comic Book & Teacher's Guide The Story of Water Supply (A Trip Behind Your Water Faucet)
Bureau of Land Management Department of Interior 18th & C Streets, N. W., Washington, D. C. 20240	
Bureau of Outdoor Recreation Department of Interior 18th & C Streets, N. W., Washington, D. C. 20240	
Bureau of Reclamation U.S. Department of the Interior 18th & C Streets, N. W., Washington, D. C. 20240	Booklet - The Miracle of Water. Report - Reclamation Accomplishments and Contributions. Committee Print #1
Bureau of Sport Fisheries & Wildlife Department of Interior 18th & C Streets, N. W., Washington, D. C. 20240	
Caterpillar Tractor Company Advertising Division Peoria, Illinois, 61611	Booklet - It's Time We Faced America's Water Problem. Poster - (Watershed) Take A Look Around Your Community. Excellent - Available in Classroom quantities. Also see film source.

Committee on Water Resources Research
Office of Science and Technology
The Executive Office Building
17th & Pennsylvania Ave., N. W.,
Washington, D. C. 20503

Corps of Engineers, U. S. Army
Department of Defense
Pentagon, Washington, D. C. 20301

Division of Environmental Engineering
and Food Protection
Public Health Service,
Department of Health, Education, and Welfare,
330 Independence Avenue, S.W.,
Washington, D. C. 20201

Division of Water Resources,
Geological Survey,
Department of Commerce
14th & Constitution Avenue, N.W.,
Washington, D. C. 20230

Educators Progress Service
Randolf,
Wisconsin 53956

Educators Guide to Free
Social Studies Materials
1967 - Listings of free
Materials

Mrs. Edith Gray
Massachusetts Audubon Society
South Great Road
Lincoln, Mass. 01773

Outlook For Water, E-1,
E-2 - "Water and Watersheds"
Folder: The Curious
Naturalist Supplement No. 9
Water Catalog & Price list:
Reference & work sheets.
Projectuals & charts.
(Nature & Conservation
Materials)

Education Services, Sta. 8
Field Enterprises Educational Corp.
Merchandise Mart Plaza
Chicago, Illinois 60654

Teacher's Guides -
Conservation SA-2418
Seasons and Weather SA-2419
$0.25 each

E. I. Dupont DeNemours & Co.
Wilmington,
Delaware

Booklet: "Clean Air and
Water - in a complex society"
#28

Field Enterprises Education Corp.
Merchandise Mart Plaza
Chicago, Illinois 60654

Index on Teaching Materials
Guides for Teachers:
Conservation, Seasons and
Weather
World Book Encyclopedia
Vol. 20 Pgs. 107-111 1966
50th Anniversary Edition

Forest Service, Department of Agriculture
14th & Independence Avenue, S.W.,
Washington, D. C. 20250

Foundation of America
814 H Street, N.W.,
Washington, D. C. 20001

Conservation of Our Natural Beauty Kit - contains materials for winning community support for conservation projects, plus materials on how to make a survey of historic and natural resources in an area

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Geological Survey
Department of Interior
18th & C Streets, N.W.,
Washington, D. C. 20240

Pamphlet - Engineering Geology
Pamphlet - Water Witching
Folder - Water & Industry
Folder - What is Water
Topographic Maps - an area

Hampden Conservation District
1400 Memorial Avenue
West Springfield, Mass. 01089

Comic Book - "The Wonder of Water"

Humble Oil & Refining Company
Public Relations Department
P.O. Box 2180
Houston, Texas 77001

Booklet: "Will We Have Enough Water?"

International Boundary and Water Commission
(U.S. & Mexico),
Mart Building,
El Paso, Texas

Joint Federal State River Basin Commissions
(Inquire from Water Resources Council,
Suite 900, 1025 Vermont Avenue, N.W.,
Washington, D. C. 20005)

Massachusetts Dept. of Education
200 Newbury Street,
Boston 16, Massachusetts

Pamphlets: Out look with Teachers Guides.
E1 - on Water
E2 - on Land and Water
J2 - on Land and Water
See Audubon Society - Mass.

Metropolitan District Commission
Boston, Mass.

Maps - Public Fishing and Boat Mooring Areas
Quabbin Reservoir

Migratory Bird Commission
Fish and Wildlife Service
Department of Interior
18th & C Streets, N.W.,
Washington, D. C. 20240

National Academy of Sciences
Nation Research Council,
2101 Constitution Avenue, N.W.,
Washington, D. C. 20418

National Association of Counties Research Foundation
1001 Connecticut Avenue, N.W.,
Washington, D. C. 20036

National Association of Soil and Water Conservation Districts
1424 K Street, N.W.,
Washington, D. C. 20005

National Audubon Society
1130 Fifth Avenue,
New York, N. Y. 10028

Nature Bulletins:
Water Pollution Control
The Story of the Ground Water Table
How to Lead a Field Trip
($0.20 each)

National Geographic Society
17 & M Streets, N.W.,
Washington, D. C. 20006

Map of Washington to Boston
1962 National Geographic

National Park Service
Department of Interior
18th & C Streets, N.W.,
Washington, D. C. 20240

Natural Resources Department
U.S. Chamber of Commerce
1615 H Street, N.W.,
Washington, D. C. 20006

National Wildlife Federation
Educational Servicing Section
1412 16th Street, N.W.,
Washington, D. C. 20036

Pamphlets: By Which We Live
Three R's and Resources
Water - By Bernard Frank (10¢)
"America's Shame-Water Pollution"
Habitat Improvement Key to Game Abundance (10¢)
Wildlife of Coastal Waters (10¢)
Estuaries - America's Most Vulnerable Frontiers. (10¢)
Folder: Birds, Flowers, Trees of America

New England Electric System
Western Mass Electric
West Springfield, Mass.

Booklets: Salem Harbor
Brayton Point
Water to Power
Yankee Ingenuity

Office of the Chief of Engineers
U.S. Department of the Army
Washington, D. C. 20315

Office of Public Information
Federal Water Pollution Control Administration
Room 702, 633 Indiana Avenue, N.W.,
Washington, D. C. 20242

Folder: What You Can Do About Pollution

Office of Saline Water
1107 16th Street, N.W.,
Washington, D. C. 20242

Office of Water Resources Research
Department of Interior
18th & C Streets, N.W.,
Washington, D. C. 20240

O'Hare Books
Ten Bentley Road
Flanders, New Jersey 07836

"A Critical Index of Films & Filmstrips in Conservation" $1.00

Public Health Service
Dept. of Health, Education and Welfare
330 Independence Avenue, S.W.,
Washington, D. C. 20201

Resources for the Future
1755 Mass. Avenue, N.W.,
Washington, D. C. 20036

Bulletin published three times a year - free

Soil Conservation Service
Department of Agriculture
14th & Independence Avenue S.W.,
Washington, C. C. 20250

Soil Conservation Service and/or
Farmers Home Administration
W.S. Department of Agriculture
14th & Independence Avenue S.W.,
Washington, D. C. 20250

Pamphlets: Community Watershed Planning - Northeast States Act to Protect Soil and Water - Program Aid 528
Teaching Soil and Water Conservation: A Classroom and Field Guide, PA 341
Know Your Soil, AIB 267
More Wildlife Through Soil and Water Conservation, AIB 175
Snow Surveys, AIB 302
Water--and the Land, Facts About Our Water Problems SCS-TP 147
Water Intake by Soil: Experiments for High School Students, MP 925
What is a Watershed? PA-420
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Soil Conservation Society of America
7515 N.W.,
Ankeny Road,
Ankeny, Iowa 50021

Comic Book - The Wonder Of Water

South Branch Watershed Association, Inc.
Box 5192
Clinton, New Jersey

Pamphlet: "You and South Branch Watershed Association"

St. Lawrence Seaway Development Corporation
Department of Commerce
14th & Constitution Avenue, N.W.,
Washington, D. C. 20230

Stuart Finley
3428 Mansfield Road
Falls Church, Virginia 22041

Pamphlets: Teamwork On The Potomac - Beargrass Creek (advertising conservation films)

Superintendent of Documents
U.S. Government Printing Office
Washington, D. C. 20402

"A Directory of Internal Resources In The U.S. - Water." ($1.50 each)
"A List of Publications on Conservation"

Tennessee Valley Authority
Woodward Building, Room 437
1426 H Street, N.W.,
Washington, D. C. 20444

The Conservation Foundation
1250 Connecticut Avenue, N.W.,
Washington, D. C. 20036

(1) A Bulletin on Conservation Education - (4 times a year) Free
(2) C. F. Letter - A Report on Environmental Issues. (12 times a year) Free

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U.S. Army Corps of Engineers
U.S. Army Engineer Division
Waltham, Massachusetts

Pamphlet: Water Resources Development by the U.S. Army Corp of Engineers in Massachusetts

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USDA Soil Conservation Service
29 Cottage Street
Amherst, Massachusetts 01002

Booklet: Massachusetts Agriculture and Soil and Water Conservation Activities

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U.S. Department of Commerce
Environmental Science Services Administration
Weather Bureau, Weather Publications Section
Rockville, Maryland 20852

Rainfall Chart for Quabbin area. Daily weather map.

U.S. Department of Health, Education and Welfare
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Division of Water Supply and Pollution Control
Washington, D. C. 20201

Pamphlet: 'What Can You Do For Clean Water?'

U.S. Department of the Interior
Office of the Secretary
Washington, D. C. 20240

Folder: Listing of Conservation Films & related Natural Resource film subjects.
Chart: Conservation & Full Utilization of Water

U.S. Water Resources Council
1025 Vermont Avenue, N.W.,
Washington, D. C. 20005

Water Industries and Engineering Services Division
Business and Defense Services Administration
Washington, D. C. 20230

Water Pollution Control Administration
Department of Interior
18th & C Streets, N.W.,
Washington, D. C. 20240

Water Pollution Control Federation
3900 Wisconsin Avenue, N.W.,
Washington, D. C. 20016

Water Resources Council
Suite 900 Vermont Avenue, N.W.,
Washington, D. C. 20005

Weather Bureau
2400 M Street, N.W.,
Washington, D. C. 20235

Wildlife Management Institute
709 Wire Building
Washington, D. C. 20005

Wisconsin Cooperative Educational Planning Program
Room 147N, State Capitol
Madison, Wisconsin 53702

Bulletin No. 20
Guide to Conservation and Resource - Education in Wisconsin Schools

Section II - Films and Filmstrips — Water and Soil Conservation

Adventures of a Junior Raindrop.

Color - animated cartoons on a raindrop visit to earth. Shows need for good watershed management.

16mm. 8 min.

Soil Conservation Service
Motion Picture Library
7600 Westchester Pike
Upper Darby, Pennsylvania 19082

(Book 2 months in advance
Borrower pays return
postage)

City Water Supply

11 min B/W $2.40 rental

Recalls man's dependence on water for life - emphasizes the problems involved in obtaining an adequate and safe city water supply.

Division of University Extension
State Department of Education
200 Newbury Street,
Boston, Massachusetts 02116

Clean Waters (20)

Effects of pollution on fish and wildlife, water supply systems, property values, and public health.

U.S. Public Health Service Audio-Visual Facility
Chamblee, Georgia 30005

Natures Plan (14)

Description of water cycle in nature; partly animated.

Encyclopedia Britannica
202 East 44th Street,
New York, N. Y. 10017

O'Hare Books
Ten Bentley Road
Flanders, New Jersey 07836

'A Critical Index of Films and Filmstrips in Conservation'
$1.00

Pure Water and Public Health

How a typical town solved the problem of inadequate water supply. 16mm., 28 min, sound, color.

Cast Iron Pipe Research Association
3440 Prudential Plaza
Chicago, Illinois 60601

Other Source

Modern Talking Picture Service
1168 Commonwealth Avenue
Boston, Massachusetts 02134

The Flood
Shows conservation practices such as Waterways, farm ponds, retention, dam, emphasis on soils capability to hold water.
16mm. 8 min.

Soil Conservation Service
Motion Picture Library
7600 Westchester Pike
Upper Darby, Pennsylvania 19082
(Book 2 months in advance. Borrower pays return postage.)

The Water Cycle #366
Encyclopedia Britannica Films
11 min., black and white

Office of Audio-Visual Services
Division of University Extension
State Dept. of Education
200 Newbury Street,
Boston, Mass. 02116 Tel. 267-9650 Ext. 46-47
$2.50 Rental (1 week)

This Waiting Land
Shows how water supplies are developed.
16mm. 27 min.

Bureau of Land Management
U.S. Department of the Interior
18th and C Streets, N.W.,
Washington, D. C. 20240

Underground Water 431-13
42 frames, filmstrip

Society for Visual Education
1345 Diversey Parkway
Chicago, Illinois 60614

Water
Tells story of water. 16mm. 9 min.

Soil Conservation Service
Motion Picture Library
7600 Westchester Pike,
Upper Darby, Pennsylvania 19082
(Book 2 months in advance. Borrower pays return postage.)

Water Bill, U.S.A.
Subj: How the 'Local Watershed Bill' helps communities solve water problems. 16mm., 20 min., sound, color.
(Free)

Caterpillar Tractor Company
Advertising Division
Peoria, Illinois 61611

Water for Farm and City
Subj: The effect of water upon the land and its people.
16mm., 13 1/2 min., sound, black and white. (Free)

Motion Picture Service
U.S. Dept. of Agriculture
Washington, D. C. 20250

Water from the Mountains
Shows importance of snow survey. 16mm. 20 min.

Soil Conservation Service
Motion Picture Library
7600 Westchester Pike
Upper Darby, Pennsylvania 19082

(Book 2 months in advance. Borrower pays return postage.)

Water In The Air #944
Encyclopedia Britannica Films, 11 min., black and white

Encyclopedia Britannica
202 East 44th Street,
New York, N. Y. 10017

Water, Water Everywhere
Coronet Films, 11 min., black and white or color

Coronet Films
Coronet Building
65 E. South Water Street
Chicago, Illinois 60601

Water - Wealth or Worry for America
Subj: Water conservation and supply. 16mm. 24 min., sound, color.

Cast Iron Pipe Research Association
3440 Prudential Plaza
Chicago, Illinois 60601

Year of Disaster
Subj: How a water management program in your community now can help avoid a 'Year of Disaster' in the future.
28 min. (Free)

Caterpillar Tractor Company
Advertising Division
Peoria, Illinois 61611

Your Friend, the Water
6 min. - b/w - $2.40 rental
color $3.60 rental

Part of a Series
Your Friend, The Soil
Your Friend, The Forest

Office of Audio-Visual Services
Division of University Extension
State Department of Education
200 Newbury Street,
Boston, Massachusetts 02116

Section III - Teacher's Book List

Approved Practices in Soil Conservation. A. B. Foster. 384 pp., illus., 3rd ed. 1964. $3.75. Interstate Printers and Publishers, Danville, Illinois 61834

A Sand Country Almanac. Aldo Leopold. 239 pp., illus., 1949. (17th printing 1964). $4.50. Oxford University Press, 417 5th Avenue, New York, N. Y. 10016

Careers In Conservation. Henry Clepper, ed. 141 pp., illus., 1963. $3.75. Ronald Press, 15 East 26th St., New York, N.Y. 10010

Concepts of Conservation: A Guide to Discussion of Some Fundamental Problems. 64 pp., 1963. The Conservation Foundation, 1250 Connecticut Avenue, N.W., Washington, D. C. 20036 (Single copies free)

Conservation--In the People's Hands. 321 pp., illus., 1964. $6.00. American Association of School Administrators, 1201 16th St., N.W., Washington, D. C. 20036

Conservationists and What They Do. C. W. Harrison. 170 pp., 1963. $3.95. Franklin Watts, Inc., 575 Lexington Ave., New York, N. Y. 10022

Conserving American Resources. Ruben L. Parson. 544 pp., illus., 2nd ed. 1964. $8.95. Prentice-Hall, Inc., Englewood Cliffs, New Jersey

County Atlas of Hampshire, Massachusetts. Beers, F. W., 36 Vesey St., New York: F. W. Beers Publishing Co., 1873. 105 pp.. Source of maps of communities by street layout from actual surveys. (Forbes Library, Northampton, Mass. - also available at OSV Library) Used for Quabbin Maps.

Historic Hampshire in the Connecticut Valley. Johnson, Clifton. The Northampton Historical Society, Northampton, Mass., Milton Bradley Company, Springfield, Mass. 1932. 406 pp.. Descriptions of communities in Hampshire County. (Used for information on Quabbin towns)

Historic Hampshire. Tercentary Editorial Committee. Northampton, Mass. Hampshire County Commissioners 1964. 364 pp.. Descriptions of towns and areas including Quabbin. (Bernard Decker's article in this)

History of the Connecticut Valley in Massachusetts. Everts, Louis H., Philadelphia 1879. 2 Vols.
Vol. 1 - Information on three communities
Vol. 2 - Springfield
(Available also at OSV Library) Source for Quabbin town histories.

Integrating Conservation and Outdoor Education Into the Curriculum. William B. Stapp. 95 pp., illus., paper cover, 1965. $2.60. Burgess Publishing Co., 426 South 6th St., Minneapolis, Minn. 55415

Introduction To The Outdoors. Ben Osborn. 36 pp., 1965. $1.00. Audubon Naturalist Society of the Central Atlantic States, Inc., 1621 Wisconsin Avenue, N.W., Washington, D.C. 20007

Letters from Quabbin. Spink, Amy, Mable L. Jones. Springfield Union, April 14, 1938 - July 19, 1938. Scrapbook - Forbes Library, Northampton, Mass.

Living Earth. Peter Farb. 177 pp., illus., 1959. $3.95. Harper and Row, 49 East 33rd St., New York, N.Y. 10016. (Also available in paperback: Worlds of Science, Pyramid Publications, Inc., 444 Madison Avenue, New York, N.Y. 10022. $0.65

Massachusetts. Booklet #74. 64 pp., illus., I1.91:M38 - $0.45. Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

Massachusetts Historical Collections. Barber, John Warner, Ed. Worcester, Dorr, Howland and Company, 1839. 22 pp..

New England Museums and Historic Houses. Booklet. New England Council, Statler Office Building, Boston, Mass. (Resources - Field Trips)

Official Topographical Atlas of Massachusetts: from Astronomical, Trigonometrical and Various Local Surveys. Compiled and corrected by H. F. Walling & O. W. Gray. Stedman, Brown & Lynn. 1871. (Forbes Library, Northampton, Mass.)

Our Wildlife Legacy. Durward L. Allen. 422 pp., illus., rev. ed. 1962. $6.50. Funk and Wagnalls, Inc., 360 Lexington Ave., New York, N. Y. 10017

Quabbin Reservoir. Clarke, Walter E., New York, N.Y., Hobson Book Press. 1946. 272 pp.. (Reproduced from a typewritten copy)

Quabbin Reservoir. 1938 Scrapbook. Forbes Library, Northampton, Mass.

Quabbin: The Lost Valley. Howe, Donald W., Ware, The Quabbin Book House, 1951. 631 pp..

Quabbin: The Story Of A Small Town. Underwood, Francis H., Boston, Lee and Shepard, 1893. 375 pp..

1001 Questions Answered About Water Resources. Floyd F. Cunningham. New York, Dodd Mead & Co., 1967. (An excellent book of reference for the teacher dealing with all aspects of water.) $6.50. (Available at the Springfield Library)

Soil Conservation Publications: Know Your Soil, AIB 267; More Wildlife Through Soil and Water Conservation, AIB 175; Snow Surveys, AIB 302; Teaching Soil and Water Conservation: A Classroom and Field Guide, PA 341; Water--And the Land, Facts About Our Water Problem, SCS-TP 147; Water Facts: Sources, Supply, Needs, Uses, Losses, Floods, Conservation, PA 337; Water Intake by Soil: Experiments for High School Students, MP 925; What Is a Watershed? PA 420. Soil Conservation Service, U.S. Dept. of Agriculture, Washington, D. C. 20250

Teaching Science Through Conservation. Martha E. Munzer and Paul F. Brandwein 475 pp., illus., 1960 $7.50. McGraw-Hill Book Co., 330 West 42nd St., New York, N Y 10036

The Big Water Fight. League of Women Voters, Brattleboro, Vermont, The Stephen Greene Press, 1966 $6.95. (Excellent section pertaining to water problem in Sudbury area of Mass.)

The Forest and the Sea: A Look at the Economy of Nature and the Ecology of Man. Marston Bates. 277 pp., 1960 $4.50., Random House, 457 Madison Avenue, New York, N.Y. 10022 (Also available in paperback: Vintage, $1.65; Signet Key, New American Library of World Literature, $0.60)

The Nature of Natural History. Marston Bates 309 pp., illus , 1950 $4.50. Charles Scribner's Sons, 597 5th Ave , New York, N.Y. 10017 (Also available in paperback (1961) The Scribner Library, $1.65)

The Soils That Support Us. Charles E. Kellogg 370 pp., illus , 1941 (latest printing 1965) $6.95 The Macmillan Company, 60 5th Ave , New York, N Y 10011

The Three R's and Resources. Wilhelmina Hill 8 pp., illus., 1959 National Wildlife Federation, 1412 16th Street, N W., Washington, D C. 20036 (Single copies free)

The Water Crisis. Senator Frank E Moss 305 pp., illus , 2nd printing 1968 $6.50 Frederick A. Praeger, 111 Fourth Avenue, New York, N Y. 10003

This Land of Ours: Community and Conservation Projects for Citizens Alice Harvey Hubbard 270 pp., 1960 $4.95 The Macmillan Company, 60 5th Avenue, New York, N Y. 10011

Water Fit To Use Carl Walter Carlson and Carlson, Bernice Wells The John Day Co , 200 Madison Ave., New York, N Y 10016

Water & Life. Lorus & Margery Milne, New York: Atheneum, 1964

Water--Or Your Life. Arthur H Carhart, New York: J. B. Lippincott Co , 1951

Water Since The World Began. Levine and Casey, New York: Dodd, Mead & Company, 1965

Western Massachusetts, A History. 1636-1925, Clarke, Will L , ed et al New York, Lewis Historical Publishing Co , Inc , 1926 528 pp. (Source of information on Shays's Rebellion and Quabbin towns)

Where There Is Life Paul B Sears 224 pp., paperback, 1962 $0.50 Dell Books, 750 3rd Ave , New York, N Y 10017

Wildlife Conservation Ira N Gabrielson 244 pp., illus , 2nd ed 1963 $5.95 The Macmillan Co , 60 5th Ave , New York, N Y 10011

Yearbook of Agriculture: 1955, Water, Government Printing Office, Washington, D C 20402

XI. Bibliography of Student Books

Children's Book List

About Grasses, Grains and Canes. John Milvin Uhl. 48 pp., illus., 1964. $2.50. Melmont Publishers, Inc. 1224 West Van Buren Street, Chicago, Illinois 60607

About the Land, the Rain and Us. Terry Shannon. 32 pp.,illus., 1963. $2.50. Melmont Publishers, Inc., 1224 West Van Buren Street, Chicago, Illinois 60607

All About Great Rivers of the World. Anne Terry White. illus. by Kurt Wiese. New York: Random, 1955. Includes importance of rivers, origin of the Nile, the development of civilization along its banks etc., the Amazon and jungle through which it flows - the Yangtze as a route of trade etc. (5-7)

All About the Weather. Ivan Ray Tannehill. Illus. by Rene Martin. New York; Random, 1953. Explains the influence of air, water, sun, and the earth's rotation. (5-8)

Arbor Day. Aileen Fisher. 36 pp., illus., 1965. $2.95. Thomas Y. Crowell Company, 201 Park Avenue South, New York, N. Y. 10003

Conservation. C. William Harrison. New York, Julian Messner, Inc., 1964. Tells the story of destroyers and plunderers of America's natural resources. (5-6). $3.64. Available at White Street School, Springfield, Massachusetts.

Conservation From A to Z. Ivah Green, 1966. Oddo Publishing Company, 201 S. Second Street, Mankato, Minn. 56002. Also available at Burgess Elementary School.

Conservation in America, Dorothy Childs Hogner. Philadelphia: Lippincott, 1958. Describes how early settlers depleted the natural resources of the land. Shows what steps are being taken to restore and conserve the resources, wildlife, forests, fish,land and waters. (7-9)

David's Ranch. Don Wilson. 64 pp., illus., new ed. 1965. $2.00. Melmont Publishers.Inc. 1224 West Van Buren St., Chicago, Illinois 60607

Down the River. 14 pp., illus., reved. 1963. $0.20. Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021

Dust Bowl: The Story of Man on the Great Plains. Patricia Lauber. 96pp., illus., 1958. $2.50. Coward-McCann, 200 Madison Avenue, New York, N. Y. 10016

Everyday Weather and How it Works. Herman and Nina Schneider. Illus. by Jeanne Bendick. New York: Whittlesey, 1951. Contains the explanation of what makes weather and how to forecast. Includes directions for making simple instruments. (5-7)

Lxploring the River. John and Jane Greverus Perry. 203 pp., illus., 1960. $3.50. Whittlesey House, McGraw-Hill Book Company, 330 West 42nd Street, New York, N. Y. 10036

Fresh and Salt Water. B. Bartrom Cadbury, 1956. Creative Educational Society, 515N. Front Street, Mankato, Minn. 56001

Grasslands. Delia Goetz. 64 pp., illus., 1959. $2.94. William Morrow and Company, 425 Park Avenue S., New York, N. Y. 10016

Junior Science Book of Water. Peterson, Ottis, Champaign, Illinois, Garrard Publishing Company.

Learning About Soil and Water Conservation. (text-workbook). Adrian C. Fox and George E. Rotter. 64 pp., illus., 1958. $0.80. Johnsen Publishing Company, 1335 R Street, Lincoln, Nebraska 68500

Man and His Resources. C. W. Mattison. 1967. Creative Educational Society, 515 N. Front Street, Mankato, Minn. 56001

Man Improves His World. (a series). Helen Heffernan and George Shaftel. 7 booklets, 96-128 pp., illus., 1963. $1.00 each. (Titles: The Soil Story, The Water Story, The Wildlife Story, The Mineral Story, The Forestry Story, The Fisheries Story, The Energy Story). The L. W. Singer Co., 249 West Erie Boulevard, Syracuse, N. Y. 13200

Mountains on the Move. Marie Halun Bloch. Illus. with drawings by Robert Gartland and photographs. New York: Coward, 1960. The work of water, wind, chemicals, ice, and earthquakes change the face of the landscape. (6-8)

My Land and Your Land Conservation Series. 4 booklets, 32 to 48 pp., illus., rev. ed. 1953. $0.25 each. Would You Like To Have Lived When? (grades 3-5). Raindrops and Muddy Rivers (grades 4-6). Plants and Animals Live Together (grades 5-7). Nature's Bank--The Soil (grades 6-8). National Wildlife Federation, 1412 16th Street, N.W., Washington, D. C. 20036

Our Friend The Forest, A Conservation Story. Patricia Lauber. 61 pp., illus., 1959. $2.00. Doubleday and Company, Garden City, N. Y. 11531

Plants of the Woodland and Wayside. Suzan N. Swain. 57 pp., illus., 1959. $2.95. Doubleday and Company, Garden City, N. Y. 11531

Plants Round the Year. (Basic Science Education Series). Glenn O. Blough. 36 pp., illus., 1953. Harper and Row Publishers, 49 East 33rd Street, New York, N.Y. 10016

Pogo's Farm Adventure: A Story of Soil. Jo and Ernest Norling. 48 pp., illus., 1948. $2.23. Holt, Rinehart and Winston, Inc., 383 Madison Avenue, New York, N. Y. 10017

Rain, Rivers and Reservoirs: The Challenge of Running Water. Sellers G. Archer. 121 pp., illus., 1963. $3.25. Coward-McCann, Inc., 200 Madison Avenue, New York, N.Y. 10016

Rivers, Irving and Ruth Adler. New York: Day, 1961. Tells why rivers are important, how they are born, their effect on land, such as weathering, making valleys and canyons, waterfalls etc.. (3-5)

Rocks, Rivers, and the Changing Earth. Herman and Nina Schneider. Illus. by Edwin Herron. New York: Scott, 1952. (4-6) (Introduction to geology)

Soil Savers. C. B. Colby. 48 pp., illus., 1957. $2.52. Coward-McCann, Inc., 200 Madison Avenue, New York, N.Y. 10016

Thanks To Trees: The Story of Their Use and Conservation. Irma E. Webber. Illus. by the author. New York: Scott, 1952. Explains trees as plants, uses, and need for conservation. (2-4)

The Amazing Seeds. Ross E. Hutchins. 159 pp., illus., 1965. Dodd, Mead & Company, 432 Park Avenue South, New York, N. Y. 10016

The First Book of Conservation. F. C. Smith. Pictures by Rene Martin. 1954. $2.50. Franklin Watts, Inc., 575 Lexington Avenue, New York, N. Y. 10022. The importance of the balance in nature and of the contribution of plants, insects, birds, and animals in preserving this balance is explained. (4-6) Available at Burgess Elem. School

The First Book of Water. F. C. Smith. 69 pp., illus., 1959. $2.50. Franklin Watts, Inc., 575 Lexington Avenue, New York, N. Y. 10022. Tells of the importance of water to man, the water cycle, the formation of rain and snow, the uses of water. (4-6)

The Earth For Sam. W. Maxwell Reed. Illus. by Karl Moseley and with photographs. New York: Harcourt, 1930. Prehistoric periods up to the Ice Age. Evolution of plant and animal life, formation of mountains and rivers, volcanoes and glaciers are told. (5-8)

The Good Rain. Alice Goudey. 26 pp., illus., 1950. $2.86. E. P. Dutton and Company, 201 Park Avenue South, New York, N. Y. 10003

The Grasses, Earth's Green Wealth. Alma Chesnut Moore. 150 pp., illus., 1960. $5.00. The Macmillan Company, 60 5th Avenue, New York, N. Y. 10011

The Ground Water Table. (Pamphlet) National Audubon Bulletin, National Audubon Society, 1130 Fifth Avenue, New York, N.Y. 10028

The Story of Dams: An Introduction to Hydrology. Peter Farb. Illus. by George Kanelous. Irvington-on Hudson, N. Y.: Harvey, 1961. EXplains reasons for building dams, the various kinds-the gravity, arch, or buttress ones of concrete, the earth dam etc.. (6-9)

The Story of Land: Its Use and Misuse Through the Centuries and Today. Cartoon booklet, 16 pp., 1964. 1-9 copies, $0.25 each; 10-99 copies, $0.12 each. Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021. (Other titles available at the same prices: Making a Home For Wildlife On the Land. 1965; Help Keep Our Land Beautiful. 1964; The Wonder of Water. 1965.

The True Book of Conservation. Richard Gates. 48 pp., illus., 1959. $2.50. Children's Press, Inc., 1224 West Van Buren Street, Chicago, Illinois 60607. Tells the story of the need for and ways of conserving natural resources. (2-4)

The Web of Nature. Ted S. Petit. 56 pp., illus., 1960. $2.95. Doubleday and Company, Garden City, N.Y. 11531

The Wind Has Scratchy Fingers. Eth Clifford and Raymond Carlson. 32 pp., illus., 1962. $2.49. Follett Publishing Company, 1010West Washington Boulevard, Chicago, Illinois 60607

The World of the Living. Earl Ubell. 40 pp., illus., 1965. $3.25. Atheneum Publishers, 162 Last 38th Street, New York, N. Y. 10016

This Is Our Soil. Ernest D. Walker and Albert B. Foster. 56 pp., illus., 1951. $0.60. Interstate Printers and Publishers, Danville, Illinois 61834

To Save the Soil. Naomi Talley. 79 pp., illus., 1965. $2.95. The Dial Press, Inc., 750 3rd Avenue, New York, N.Y. 10017

Water. Bertha M. Parker, Harper & Row Publishers, Inc., 49 E. 33 Street, New York, N. Y. 10016

Water. Ivah Green. Coward-McCann, Inc., 200 Madison Avenue, New York, N. Y. 10016

Water and Watersheds. Curious Naturalist, September 1963. Available from Massachusetts Audubon Society, South Great Road, Lincoln, Mass. (Pamphlet)

Water--A Resource. Matthew Vessell & Herbert H. Wong, Fearon Science Education Series, Fearon Publishers, Inc., 2165 Park Blvd., Palo Alto, California 94306

Water At Work. Meyer, Jerome S., New York, The World Publishing Company. 1963. (Excellent) (4) $3.00.

Water Conservation. Ivah Green. Coward McCann Inc., 200 Madison Avenue, New York, N. Y. 10016
(2 copies at Burgess Elem. School)

2

Water Fit To Use. Carlson, Carl and Bernice, New York, The John Day Company. 1966. (Excellent)

Water for America: The Story of Water Conservation. Edward Harrison Graham and William Richard Van Dersal. Illus. with photographs. New York: Oxford, 1956. Topics deal first with water in its various forms - snow, rain, and clouds, then with the water on the earth and its uses. (5-7)

What Is Soil? B. John Syrocki. 48 pp., illus., 1961. $1.80. Benefic Press, 1900 North Narrangansett Avenue, Chicago, Illinois 60639

Water: Our Most Valuable Natural Resource. Ivan E. Green. Illus. with photographs. New York: Coward-McCann, Inc., 200 Madison Avenue, New York, N. Y. 10016. 1958. Tells where water comes from, where it goes, and what it is used for. (6-8)

Water: Riches or Ruin. Helen Bauer. Illus. with drawings and photographs. New York: Doubleday, 1959. Explains depletion of the water supply-cutting of forests and plowing of land, erosion and disturbance of the balance of nature. (3-6) (Excellent source for children - good pictures)

Weather: Air Masses, Clouds, Rainfall, Storms, Weather Maps, Climate. Paul E. Lehr, R. Will Burnett, and Herbert S. Zim. Illus. by Harry McNaught. New York: Simon, 1957. Tells how heat, air movements and the 'watercycle' make the weather. Description of how clouds are formed and what makes rain, snow, hail, dew and frost. (6-9)

Wildlife For America: The Story of Wildlife Conservation. Edward Harrison Graham and William R. Van Dersal. New York: Walck, 1949. Describes wildlife in the beginning, tells how a change in the environment means a change in wildlife, and points out the need for cover to maintain the birds and animals, importance to man and measures being taken for conservation. (5-8)

Willy - A Story of Water. Jerome Spar. 1965. Oddo Publishing Company, 201 S. Second Street, Mankato, Minnesota 56002 (Available at Burgess Elem. School)

THE CONSTRUCTION OF A TEST FOR CONCEPT LEARNING AND IDENTIFICATION OF THE COGNITIVE PROCESS REQUIRED

Curriculum Model #1

Resource Learning Laboratory

Title III - PACE

Sturbridge, Massachusetts

01566

Experimental Edition - Revised January 1970

WATER

Directions

This is a test of your ability to apply skills and understandings which you have been learning since you entered school.

Your answer must be marked on the answer sheet which had been provided for your. Do not make any stray marks. If you make an error, erase it completely before marking your new answer.

MAKE NO MARKS IN THE TEST BOOKLET

The following is a sample question to show you how your answers are to be marked.

1. The subject of the test is

   A. water
   B. air
   C. noise
   D. gas
   E. fire

A. [ ] B. [ ] C. [ ] D. [ ] E. [ ]

PART I

1. Which of the following belong together?

   A. valley

   B. hill

   C. bridge

   D. park

   E. mountain

2. A watershed is

   A. a wet region of land

   B. a building for storing water

   C. a marshy area

   D. the land area which drains to a stream

   E. the land area near a swimming pool

3. The best name for this group - mountain, plateau, hill - is

   A. region

   B. landforms

   C. area

   D. town

   E. playground

4. Man can control the flow of water by

   A. planting trees and building dams

   B. building dams and filtering water

   C. using water meters and planting trees

   D. filtering water and planting trees

   E. none of these

5. Which of the following belong together?

   A. rainfall

   B. drinking fountain

   C. ground water

   D. swimming pool

   E. rivers and streams

6. What would you call this group - rainfall, snowfall, rivers? (Choose the best name.)

   A. water control

   B. water sources

   C. water storage

   D. water table

   E. watershed

7. A water shed community includes

   A. towns and turnpikes

   B. people and towns

   C. people and animals

   D. towns and animals

   E. towns

8. Water flows from

   A. east to west

   B. lowlands to highlands

   C. highlands to lowlands

   D. west to east

   E. none of these

9. Which of the following have caused natural changes in landforms?

   A. roads and highways
   B. glaciers and fast streams
   C. dynamite and rainfall
   D. running water and irrigation
   E. none of these

10. A tributary is

   A. a stream flowing south
   B. a stream which feeds a larger stream
   C. a river system in Massachusetts
   D. a stream which has pure water
   E. a large gully along the road

11. As more people draw upon the same water supply the amount of available water tends to

   A. increase
   B. decrease
   C. remain the same
   D. evaporate
   E. none of these

12. As man develops new machines such as the dish washer, clothes washer, lawn sprinklers.....he

   A. uses less water
   B. uses more water
   C. uses water carefully
   D. increases the supply of water
   E. none of these

13. Boston searched for a supplementary water supply as

A. population decreased

B. population increased

C. rainfall increased

D. the number of industries decreased

E. none of these

14. Which of the following would you consider when searching for a water supply for a large city?

A. the closest stream and pure water

B. a natural lake

C. pure water

D. an abundant supply and pure water

E. none of these

15. Population increases in a community most likely results from

A. increased rainfall and hot climate

B. available jobs and increased rainfall

C. new people in our country

D. new people in our country and available jobs

E. none of these

16. Population decreases in a community most likely results from

A. decline in the number of businesses

B. better schools in the community

C. better jobs elsewhere

D. decline in businesses and better jobs elsewhere

E. none of these

17. A Reservoir usually supplies water for

    A. industrial use

    B. domestic use

    C. industrial and domestic use

    D. recreation

    E. irrigation

18 Desalinization is the process of removing

    A. impurities from water

    B. silt from water

    C. germs from water

    D. fish from water

    E. salt from water

19. Factors contributing to the greatest pollution of water are

    A. the water cycle and people

    B. people and ground water

    C. industrial wastes and people

    D. ground water and rivers

    E. industrial wastes and ground water

20. The primary purpose in filtering water for drinking is to

    A. remove the rocks

    B. remove the fish

    C. remove the impurities

    D. remove the color

    E. none of these

21. Water meters in homes record

A. the number of people using water

B. the purity of the water

C. the amount of water being used

D. the number of faucets in the house

E. the number of baths people take

22. Irrigation means to

A. purify water

B. water growing crops

C. measure water

D. evaporate water

E. water animals

23. Water that is filtered has been

A. heated for swimming

B. cooled for cooking

C. cleaned by straining

D. chlorinated for drinking

E. none of these

24. Domestic water is used

A. for water skiing

B. in the home

C. in the factory

D. for transporting goods

E. for boating

25. New England is a region which includes

A. Massachusetts and Connecticut

B. Rhode Island

C. New Hampshire

D. Maine and Vermont

E. all of these

26 The primary purpose of a dam is to

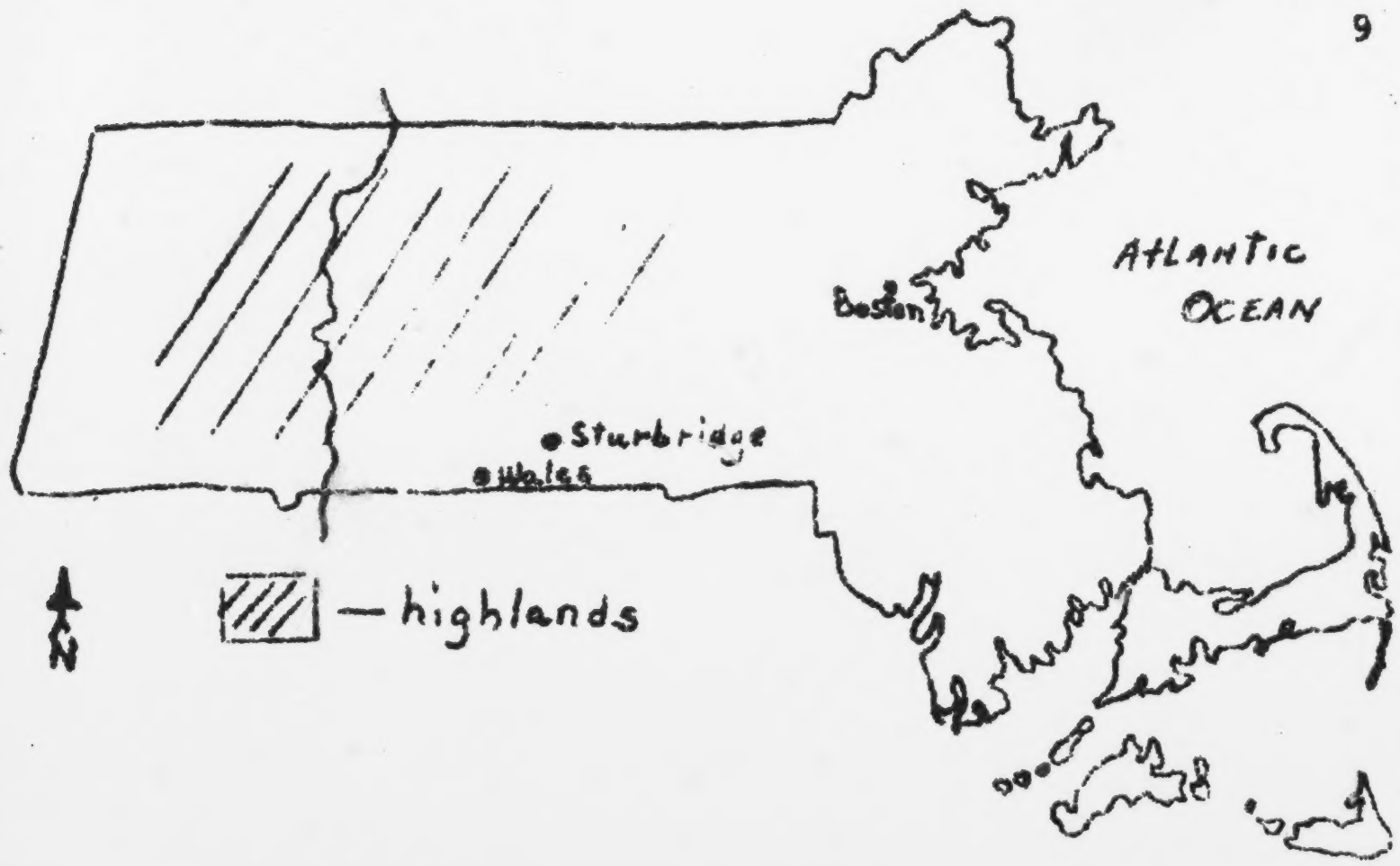
A. supply water

B. control water

C. purify water

D. heat water

E. none of these



27. Water traveling from our town to Boston is

A. flowing south

B. flowing north

C. flowing east

D. flowing west

E. none of these

28. The land elevation in your town is

A. below sea level

B. at sea level

C. the same as Boston

D. lower than Boston

E. higher than Boston

29. The Connecticut River flows in a

A. northerly direction

B. westerly direction

C. southerly direction

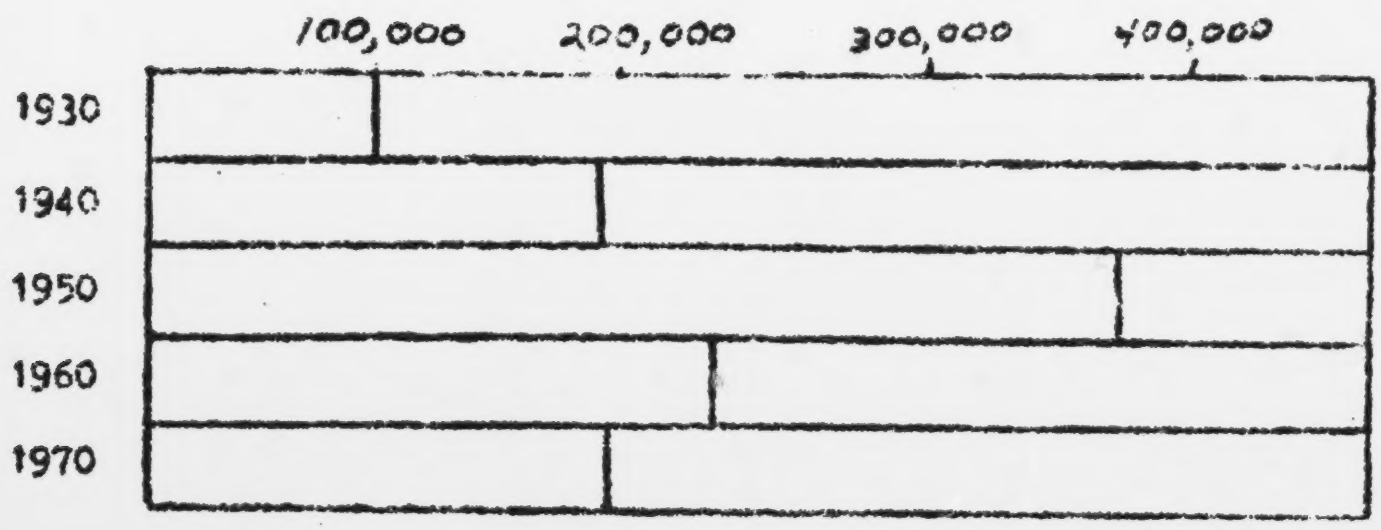
D. easterly direction

E. none of these

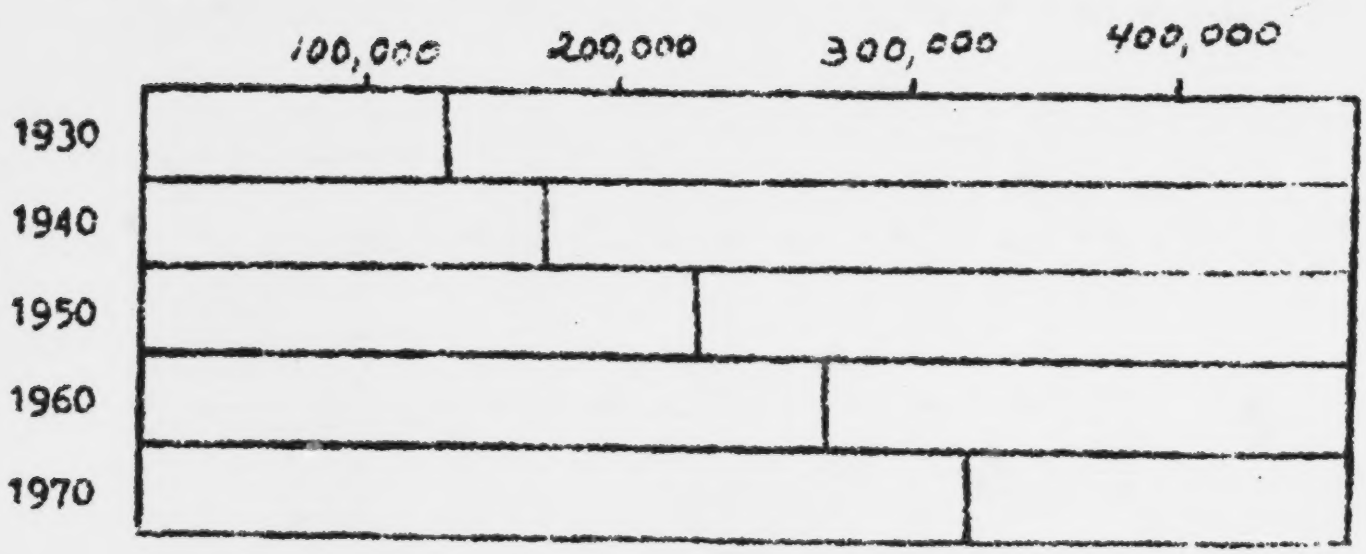
30. Using the population charts below, which of the cities would probably need more water in 1970?

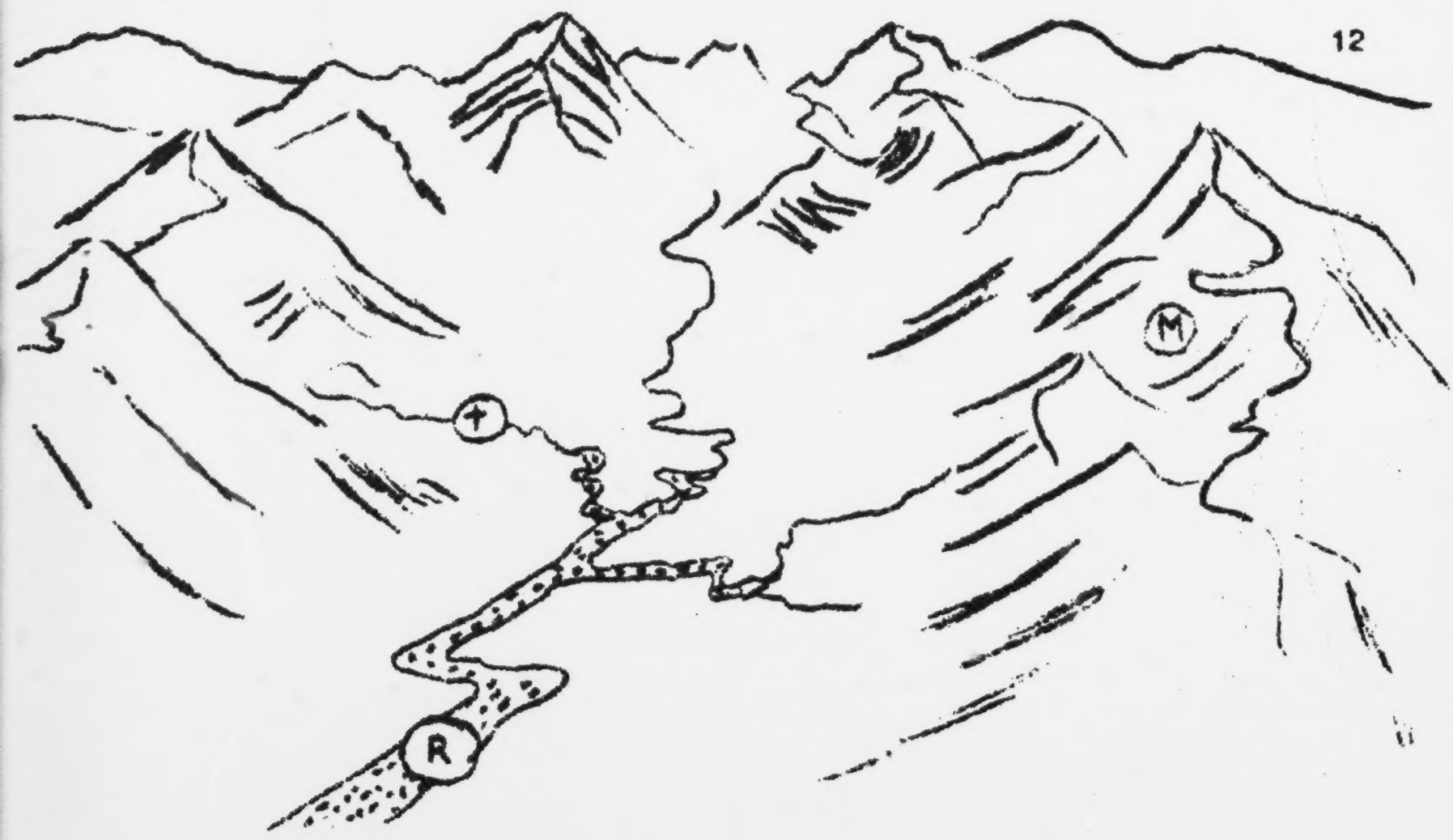
Population Changes

City A



City B





31. In the picture above the letters R, T, and M stand for

    A. Roadway, Tourist and Mountain

    B. River, Trail and Mound

    C. Mountain, Trail and River

    D. River, Tributory and Mountain

    E. none of these

32. The best name for this picture is

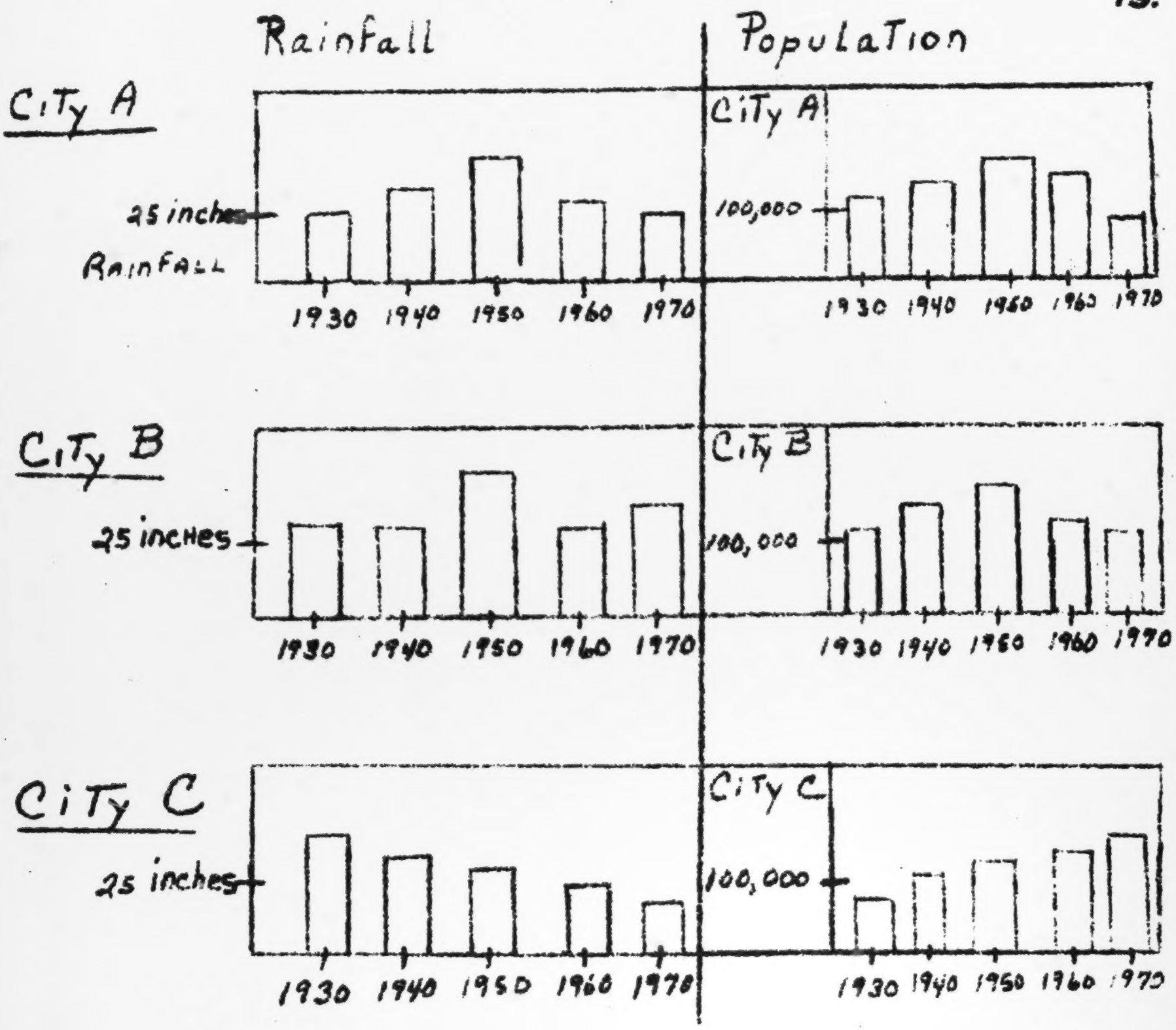
    A. hills

    B. ground water

    C. reservoir

    D. watershed

    E. landforms



These are rainfall and population graphs for three different cities. Each of these cities has asked the state to help them find a new supply of water. The state says they can only help one of the cities this year.

PART II

1. Examine the conclusions given below. Using the graphs on the opposite page, which <u>one</u> do you think is justified? (The best conclusion)

    A. City A is a rapidly growing community and does not have enough water for the people.

    B. City B is entitled to help from the state as they have the greatest need for a new water supply.

    C. City C is experiencing many problems with water shortage.

2. Choose the statement which explains your conclusion.

    A. City A is near to us and we have relatives there. If they want more water they should have it.

    B. The governor lives in City B and therefore they need help from the state to provide them with a new water supply.

    C. Many people have moved into City C and yet the rainfall has been constantly decreasing.

    D. All three cities need more water due to growth in population.

    E. All three cities are experiencing water problems due to decreasing rainfall.

Factory and Fish

A committee has been working on a problem of what to do about a large factory in their town. This factory is polluting the river and as a result many of the fish in the river have died. Some of the townspeople think the factory should be made to move out of town. Other townspeople feel the factory is more important than the fish. There are many people in town who work there.

3. What do you think the committee should do? Choose the best solution.

   A. The factory should be made to move out of the town.

   B. The factory should be allowed to stay and operate as they are.

   C. The factory should be allowed to stay if they install a purifying plant.

4. Choose the statement below which best explains the solution you chose.

   A. The plant should be made to move. If they move there are other jobs in other factories for the workers. They will only have to travel a short distance.

   B. The factory should be allowed to stay. The job is more important than the fish. Fisherman can fish in other streams.

   C. They should install a purifying plant. No matter where they move they will have to do this as no one will allow them to pollute the river.

   D. The town should help to pay for the purification plant as many townspeople fish in the river.

   E. Make them move as we don't want factories dirtying our town. Besides, the more factories, the more people and we might have to build a new school.

5. Suppose that a large city is in need of a new water supply. Briefly describe the factors which you would consider in searching for this supply.

6. Suppose that you are told by the Selectmen that they think your town will not have an adequate water supply in 10 years. Outline a plan to test whether their belief is true or false.